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LUNG CANCER DEATH RATES IN ENGLAND AND WALES COMPARED WITH THOSE IN THE U.S.A.

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The large differences between reported lung cancer death rates in England and Wales and in the United States have not yet been explained satisfactorily. A study of these differences may well lead to a better understanding of the aetiology of this disease. While the data available at the present time are inadequate for the purpose, they are worth discussing as a basis for further investigations.

The lung cancer death rate reported by the Registrar General for England and Wales in 1955 was 69.3 per 100,000 population for males and 10.6 per 100,000 for females. Standardizing the lung cancer death rates reported by the National Office of Vital Statistics for the United States in 1955 to the age distribution of the population of England and Wales in 1955, the rates were only 33.0 per 100,000 population for males and 6.7 per 100,000 population for females. In other words, the lung cancer death rate in England and Wales for males was 2.1 times as high as in the United States and for females 1.6 times as high. These ratios did not vary greatly in different age groups. For example, among males the ratio of the rate in England and Wales to the rate in the United States was 1.9 in age group 25–34; 2.0 in age group 35–44, 2.0 in age group 45–54; 2.2 in age group 55–64; 2.1 in age group 65–74; and 1.8 in age group 75–84.

Fig. 1 shows reported lung cancer death rates for males and females in age group 45–54 for England and Wales and for the United States from 1931–5 to 1956. The rates for the United States are for the white population only. Fig. 2 is similar but for age group 65–74. For males in both countries and both age groups the rates increased rapidly during this period of time. Within each age group the trend lines (plotted on semi-log paper) are roughly parallel for the two countries, but at a much higher level for England and Wales than for the United States. After 1948 the rate of increase was less in age group 45–54 than in age group 65–74.

The picture is somewhat different for females. From 1931–5 to 1948 the female rates in each of the two groups were only slightly higher in England and Wales than in the United States and generally increased in both countries during this period of time. The female rates continued to increase after 1948 in England and Wales but not in the United States.

It should be noted that a small number of deaths from cancer of the respiratory system other than the lungs—for example, pleura, trachea, and mediastinum—are included in some of the figures quoted above. These inclusions are slightly different in figures from the two countries. However, the effect of this is trivial, since all but a very small percentage of the deaths are presumed to have been due to bronchogenic carcinoma.

Both the form of the death certificate and the rules for classifying deaths by cause were changed in the United States as from January 1, 1949. Changes in the rules for classification were also made in England and Wales in 1949, while the form of the death certificate had been changed at an earlier date.

The changes in reporting procedures in the United States may be responsible for the change in the trend lines for females which occurred after January 1, 1949. However, if this explanation is correct, it is hard to see why a change of similar magnitude did not occur in the trend lines for males.

Cigarette Smoking

There is evidence that, in both countries, lung cancer is highly associated with cigarette smoking (Doll and Hill, 1956; Hammond and Horn, 1958a, 1958b). Let us consider the hypothesis that differences in degree of exposure to cigarette smoke (or certain components of the smoke) account for the reported differences in lung cancer death rates between the two countries.

At least five different factors may be of importance in determining the degree to which the lungs of a cigarette smoker are exposed to important ingredients of the smoke. These are: (1) the average number of cigarettes smoked per day, (2) the number of years of smoking, (3) the degree to which the smoke is inhaled, (4) the proportion of each cigarette which is actually smoked, and (5) the amounts of various chemical ingredients in the main stream smoke of the cigarette. These are discussed in turn.

Average Daily Consumption

Cigarette smoking apparently became popular at an earlier date in the United Kingdom than in the United States. In 1935 the consumption per adult per annum of packeted cigarettes is reported to have been 1,589 in the United Kingdom and 1,410 in the United States (Todd, 1957). Cigarette consumption increased in both countries, but to a greater extent in the United States than in the United Kingdom. In 1956 the reported consumption per adult per annum of packeted cigarettes was 2,509 in the United Kingdom and 3,195 in the United States. The increase in total cigarette consumption was probably slightly less than these figures appear to indicate, since there was a decline in the use of hand-rolled cigarettes. It is also possible that more

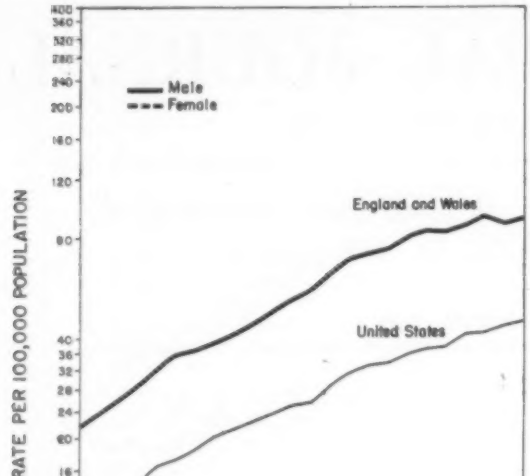

FIG. 1.—Lung cancer death rates, by sex, at age 45–54 for England and Wales and United States (white population) in 1931–5 to 1956. Source of data: Registrar-General of England and Wales and United States National Office of Vital Statistics.

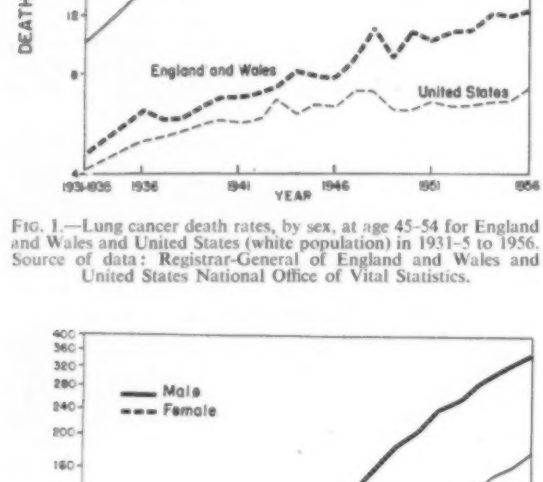

FIG. 2.—Lung cancer death rates, by sex, at age 65–74 for England and Wales and United States (white population) in 1931–5 to 1956. Source of data: Registrar-General of England and Wales and United States National Office of Vital Statistics.

hand-rolled cigarettes are now being smoked in the United Kingdom than in the United States. In the United Kingdom in 1956, 7.0% of all male cigarette smokers and 0.2% of all female cigarette smokers said that they smoked only the hand-rolled variety. However, 12.7% of male cigarette smokers in age group 60 and older still smoked only hand-rolled cigarettes. Information on this is not available for the United States.

For a proper comparison of cigarette consumption in the two countries one would need to know for each sex and for each five-year or ten-year age group the proportion of people who smoke cigarettes at each of several levels of number per day. This information is available for the United States for 1955 (Haenszel, Shimkin, and Miller, 1956) but is not available in such detail for the United Kingdom. However, some very useful data on the subject have been reported by the Tobacco Manufacturers' Standing Committee (Todd, 1957) for the United Kingdom in 1956. These are summarized in Tables I and II. Unfortunately, differences in age groupings and possible differences in definitions make comparisons between the two countries a bit difficult. About 4% of the people interviewed in the United States said that they smoked cigarettes "once in a while, not every day." These have been included as cigarette smokers in Tables I and II because the same procedure seems to have been used in the study in the United Kingdom.

TABLE I.—*Percentage of People Smoking Cigarettes by Age and Sex in the United Kingdom and in the United States of America*

United Kingdom, 1956		United States, 1955	
Age	% Smoking Cigarettes	Age	% Smoking Cigarettes
Males			
16–24	60·7	18–24	59·3
25–34	70·9	25–34	69·2
		35–44	68·0
35–59	71·0	45–54	63·5
		55–64	51·1
60 and over	52·6		
		65 and over	29·5
Total ..	66·0	Total ..	59·2
Females			
16–24	39·2	18–24	37·7
25–34	51·8	25–34	43·0
		35–44	38·9
35–59	44·7	45–54	29·0
		55–64	16·7
60 and over	28·8		
		65 and over	8·1
Total ..	41·6	Total ..	30·9

TABLE II.—*Percentage Distribution of Cigarette Smokers by Number Smoked Per Day for Males and Females in the United Kingdom in* 1956 *and the United States of America in* 1955

Cigarettes Per Day	Males		Females	
	U.K.	U.S.A.	U.K.	U.S.A.
<10	25	23	55	45
10–20	57	53	40	47
>20	18	24	5	8
Total ..	100	100	100	100

In age group 16–24 in the United Kingdom and age group 18–24 in the United States it appears that the proportion of people who smoke cigarettes is about the same in the two countries. The same is true of males in age group 25–34. In all other groups, particularly in the old-age group, it appears that a larger percentage of people smoke cigarettes in the United Kingdom than in the United States. The difference is most marked among women in age group 60 and older.

These figures suggest that the difference in reported lung cancer death rates between England and Wales and the United States may be partly due to the fact that there are

proportionally more cigarette smokers in the former than in the latter country (in age groups where lung cancer most frequently occurs). However, if this be true, it would seem that the ratio of the lung cancer death rate in the United Kingdom to the lung cancer death rate in the United States should increase with age and be highest in women in the old-age group. This does not appear to be the case.

For all age groups combined it appears that a somewhat larger percentage of cigarette smokers are in the over-20-cigarettes-a-day class in the United States than in the United Kingdom (see Table II). This should tend to nullify some of the effect (on lung cancer death rates) of the larger proportionate number of cigarette smokers in the United Kingdom than in the United States. Unfortunately, these figures are not available by age groups (which might perhaps alter the picture).

Number of Years of Smoking

There is reason to suppose that, other things being equal, the longer a person has smoked cigarettes the greater is the likelihood that he will develop lung cancer. Since smoking became popular at an earlier date in the United Kingdom than in the United States, it may be that there is a larger proportion of long-time cigarette smokers in the former country than in the latter. However, the great majority of men in the United States in age group 50–69 who are currently smoking cigarettes took up the habit before reaching the age of 25 (over half took it up before the age of 20) (Hammond and Horn, 1958a). This being the case, it seems unlikely that a difference, if any, in the number of years that cigarette smokers have been addicted to the habit could account for the large difference in lung cancer death rates between England and Wales and the United States.

Inhaling

A study by Schwartz and Denoix (1957) seems to indicate that, holding age, sex, type of smoking, and amount of smoking constant, smokers who inhale run a greater risk of lung cancer than do smokers who do not inhale. Data reported by the Tobacco Manufacturers' Standing Committee (Todd, 1957) indicate that the proportion of cigarette smokers who inhale: (*a*) increases with amount of smoking, (*b*) decreases with age, and (*c*) is greater among men than among women. We have recently made a study of inhalation in relation to age, type of smoking, and amount of smoking among men in the United States (Hammond, 1958). The findings of our study are in agreement with those of the British study.

In the British study the men were asked the simple question, "Do you inhale?" In our study the subjects were asked how much they inhale, given the choice between "do not inhale," "inhale slightly," "inhale moderately," and "inhale deeply." We are under the impression that the answers "inhale moderately" and "inhale deeply" taken together are roughly comparable to the answer "yes" in response to the question, "Do you inhale?" The following comparisons are valid only if this assumption is correct. Disregarding age, amount of cigarette smoking, and whether pipes and cigars were smoked as well as cigarettes, the proportion of male cigarette smokers who inhale is about 84% in the United Kingdom and about 82% in the United States. Among men under 60 years of age who smoke about a pack of cigarettes a day (or 15 to 24 cigarettes), about 91% inhale in the United Kingdom and 88% inhale in the United States. The comparable figures for age group 60 and older are 67% for the United Kingdom and 65% for the United States. These percentages for the two countries are remarkably close.

Proportion of Cigarette Smoked

Much of the tar and nicotine volatilized just behind the burning tip of a freshly lit cigarette is condensed as it is drawn through the cigarette towards the mouth of the smoker. This condensed material is largely revolatilized as smoking continues. As a result, the smoke from the last part of a cigarette which can be smoked is far richer in these ingredients than is the smoke from the portion first consumed. Some observers are under the impression that American smokers often discard a cigarette after taking only a few puffs, while this seldom happens in the United Kingdom. If true, this might make an appreciable difference in the degree to which smokers in the two countries are exposed to tobacco smoke.

Since casual observations can be very misleading, I have undertaken to collect some data on this subject in the United States, hoping that data for comparison will soon be available in the United Kingdom. There is no information on what factors influence the extent to which each cigarette is smoked, but it seems likely that the location and current activities of the smoker as well as individual idiosyncrasies play a part. With this in mind, I had 4,283 discarded cigarette butts collected from a variety of different locations, including business offices, private homes, restaurants, sidewalks of city streets, railroad and bus stations, and a public park. The collection was carried out in four large cities (Los Angeles, Chicago, Pittsburgh, and New York) and several smaller cities and towns (Harrisburg and Bradford, Pennsylvania; Oak Park, Wheaton, and Brookfield, Illinois; and Albany, New York). The butts were divided into those with filter-tips and those without filter-tips. Each butt was straightened out and the length of the remaining paper was measured. When the paper was burned farther down on one side than on another, the average length of the remaining paper was recorded. The results are shown on Table III.

The average length of all the butts was 30.9 mm., being 31.0 mm. for those with filter-tips and 30.7 mm. for those without filter-tips. Only 0.2% of the butts with filter-tips and 1.8% of those without filter-tips measured less than 15 mm., while 8.2% and 9.4% respectively measured less than 20 mm. Most filter-tip cigarettes are 85 or 80 mm. in total length, of which 17 or 18 mm. is taken up by the filter; but some are shorter in total length and some have shorter filters (the average length being about 82 mm.). About two-thirds of the cigarettes without filters sold in the United States in 1957 measured 70 mm. and most of the remainder measured 85 mm., the average length being about 75 mm. Since both filter-tip and non-filter-tip butts average about 31 mm. in length, it appears than on the average about

TABLE III.—*Lengths of Cigarette Butts Collected from Various Locations in the United States of America in* 1958

Location or Type of Cigarette	No. of Butts	Mean Length in mm.	Length of Butts in mm.									
			<15	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55+
			%	%	%	%	%	%	%	%	%	%
Total	4,283	30·9	0·8	7·9	19·7	19·9	20·9	12·8	8·9	4·4	2·7	2·0
Non-filter-tip	1,697	30·7	1·8	7·6	17·1	22·1	21·8	12·6	8·7	4·4	2·2	1·9
Filter-tip	2,586	31·0	0·2	8·0	21·3	18·4	20·4	13·0	9·1	4·3	2·9	2·2
Homes	1,563	30·1	1·1	8·2	19·6	22·4	21·9	12·0	7·8	3·6	2·4	1·0
Offices	1,117	30·3	1·1	7·6	21·5	19·5	20·9	13·6	7·6	3·8	2·4	1·9
Restaurants	496	34·5	0·6	4·0	11·1	16·9	19·4	18·7	15·3	7·1	2·8	4·0
Sidewalks	496	32·4	0·4	5·8	19·4	19·2	17·9	12·9	10·9	5·8	4·0	3·6
Stations	271	32·8	0·4	7·7	9·2	19·9	27·3	11·8	10·3	5·5	4·4	3·3
Park	340	26·7	0·3	15·9	35·3	14·7	18·2	5·9	5·0	2·1	1·8	0·9

38% of each filter-tip cigarette and about 41% of each non-filter tip cigarette is discarded.

At my request, Dr. Remmert Korteweg has collected and measured cigarette butts discarded by several different groups of people in the Netherlands and has kindly given me permission to publish his findings. Altogether, 545 butts were measured. The mean length was only 19.7 mm.; 19.6% were less than 15 mm. in length and 55.6% were less than 20 mm. in length. Dr. Korteweg warns that these are preliminary figures. Nevertheless, the very large difference between his findings in the Netherlands and my finding in the United States is suggestive. If an equally large difference of this kind exists between the United Kingdom and the United States, it may well account for the difference in reported lung cancer death rates.

There are some obvious difficulties in the method used in this study of cigarette butts. For one thing, the cigarette butts collected may not have been reasonably representative of all the cigarette butts discarded in the United States in the early part of 1958. More important, it is questionable whether the length of a discarded cigarette butt is a reliable index of the amount of smoke which was drawn into the mouth of the smoker. For example, lighted cigarettes are sometimes left to burn out in an ash-tray or on the ground. Furthermore, much of a cigarette may burn up while being held in the hand or left in an ash-tray between puffs. Thus a short butt does not necessarily indicate that most of the potential smoke from the cigarette was drawn into the mouth of a smoker. On the other hand, a long butt is sure proof that the smoker failed to avail himself of a large proportion of the potential smoke. In spite of these difficulties, I hope that the method is sufficiently reliable to reveal a large difference in this respect between Great Britain and the United States if a large difference in fact exists.

Chemical Composition of the Smoke Stream

Cigarettes were very much a standard product in the United States up until a few years ago. Now there are a great variety of types on the market, including "regular size" and "king size"; those without filter-tips and those with filter-tips of various degrees of effectiveness; some with the nicotine partly removed from the tobacco; and some with types of tobacco producing relatively low nicotine and tar in the main stream smoke. In addition, some brands with filter-tips began to contain more heavy burley-type tobacco and less light flue-cured tobacco in their blends. This probably nullified the benefit, if any, to be derived from the filter-tip.

In the middle of 1957 the amount of nicotine in the main stream smoke of the more popular brands of cigarettes in the United States varied from about 1.8 to 3.1 mg. and the amount of tar varied from about 25.6 to 42.8 mg. (Miller and Monahan, 1957a). If the number of cigarettes of each brand sold (Wooten, 1957) and the composition of the smoke are taken into account, the main stream smoke of the average cigarette had about 2.6 mg. of nicotine and 28.8 mg. of tar. Later that year a filter-tip cigarette with only 1.1 mg. of nicotine and 19.7 mg. of tar in the main stream smoke was put on the market (Miller and Monahan, 1957b). It immediately became popular, probably owing in part to an article on the subject which appeared in an influential magazine. To-day there are several additional low nicotine and low tar brands on the market. There have been no reports on the content of carbon monoxide and other gases in the main stream smoke of these cigarettes as compared with others. It appears that these new cigarettes are selling well. It remains to be seen whether they will eventually replace the old type and, if so, whether smokers will be benefited in terms of health.

Other Environmental Factors

Now let us consider the hypothesis that some environmental factor other than smoking entirely accounts for the difference in lung cancer death rates between the two countries.

It is well established that lung cancer can be caused by many years of heavy exposure to dusts of certain types—for example, radioactive minerals, chromates, and nickel (Hammond and Machle, 1956). Hueper (1955) has expressed the opinion that workers in various industries are exposed to a great many different substances (in the form of dust, gas, or vapour) that are of aetiological significance in lung cancer. This is difficult to prove one way or the other, because it is usually hard to find sufficiently large groups of workers who have had long exposure to known concentrations of specific dusts. Many of the dusts under suspicion in relation to lung cancer—for example, asbestos and beryllium—produce other serious effects upon the lungs. For this reason, intensive efforts have been made in the United States and elsewhere to protect workers from undue exposure. Presumably this would reduce or eliminate any potential lung cancer hazard.

General air pollution has long been under suspicion. The substances most often mentioned in this respect are: (*a*) fumes from motor vehicles and oil furnaces, (*b*) combustion products of coal, and (*c*) dust from asphalt roads. All of these contain small quantities of known carcinogenic substances. In addition, certain industrial plants discharge fumes which produce air pollution in the surrounding area. Some of these fumes may contain carcinogenic substances. The fact that these air pollutants contain carcinogenic substances does not necessarily prove that they cause lung cancer.

What concerns us here is whether a difference between England and Wales and the United States in respect to either occupational exposures or general air pollution could account for the differences in lung cancer death rates. Stocks and Campbell (1955) have studied lung cancer death rates among men aged 45 to 74 in relation to type and amount of smoking in Liverpool compared with several small English cities and a rural area in Wales. There is considerable air pollution in Liverpool, and the Liverpool area has a high lung cancer death rate. There is almost no air pollution in the rural areas studied. In each of these areas the lung cancer death rate was found to be of the order of magnitude of 300 per 100,000 population per year higher for heavy cigarette smokers than for non-smokers. Among non-smokers and smokers alike, the lung cancer death rate was roughly 100 per 100,000 per year higher in Liverpool than in the rural area of Wales. The lung cancer death rate in the small cities was about the same as in the rural areas. Hammond and Horn (1958b) have studied lung cancer death rates in relation to smoking habits among men aged 50–69 in large cities, small cities, and rural areas of the United States. The rate was about 250 per 100,000 per year higher among heavy cigarette smokers than among men who never smoked. Both for smokers and non-smokers the lung cancer death rate was roughly 20 per 100,000 per year higher in large cities than in rural areas.

Since the data quoted above are almost the only information available on the subject for the moment, let us assume: (*a*) that air pollution, occupational exposure, or some other factor associated with urbanization produces an increase in the lung cancer death rate, and (*b*) that the force of this effect among males in age group 50–69 is 80 per 100,000 population per year greater in English and Welsh cities than in cities in the United States. Further, let us assume that this differential applies to three-fourths of the male population of both countries (people living in rural areas and cities such as Chester and Wrexham not being affected). Under these assumptions, the lung cancer death rates of males in age group 50–69 should be about 60 per 100,000 higher in England and Wales than in the United States.

In 1956 the reported lung cancer death rate among males in age group 50–69 was 233 per 100,000 in England and Wales and 115 per 100,000 in the United States, a difference of 118 per 100,000. This reported difference is about twice as large as might be expected on the basis of the hypothesis outlined above. Thus, even assuming that Liverpool is typical of all urban areas in England and Wales, it appears

that the difference in male lung cancer death rates between England and Wales and the United States cannot be attributed entirely to differences in air pollution or occupational exposures. Actually, Liverpool is far from typical. According to a report of the Registrar General (1957), the male lung cancer death rate in Merseyside (which includes Liverpool) is higher than in any other region of England and Wales and is 42% higher than for England and Wales as a whole. Furthermore, it is no criticism of the excellent work of Stocks and Campbell to say that it is difficult to obtain an accurate estimate of the lung cancer death rate of non-smokers and that their findings have not yet been verified by other investigators or in other cities with heavy air pollution.

Climate is another factor which cannot be ignored. In some heavily populated areas such as London and Los Angeles peculiar atmospheric conditions produce episodes of "smog" from time to time. From what little evidence is available, it appears that a far larger proportion of the population live in areas where this is a problem in England and Wales than in the United States. In addition, the climate of the British Isles is apparently such as to produce a higher incidence of bronchitis than in the United States. While it seems unlikely that bronchitis alone can result in lung cancer, it is not unreasonable to postulate that bronchitis increases the susceptibility of an individual to the carcinogenic effect of some other factor such as cigarette smoke or air pollutants.

Accuracy of Diagnosis

Finally, let us consider the hypothesis that differences in diagnosis and recording of deaths by cause entirely account for the difference in lung cancer death rates between the two countries.

The problem of accuracy of diagnosis plagues us whenever we attempt to compare death rates from cancer of specific sites in different periods of time, different countries, or different sections of the same country. For example, there is reason to suspect that lung cancer, when present, is somewhat more likely to be diagnosed in urban areas than in rural areas of the United States (doctors and medical facilities being concentrated in cities). This being the case, we are not at all sure that the small difference between urban and rural areas in lung cancer death rates among men with the same smoking habits is real or whether it is merely the result of differences in diagnosis. Likewise, it is reasonable to suppose that, owing to improvements in medical science, lung cancer is more likely to be correctly diagnosed to-day than it was thirty or forty years ago. It seems likely that some of the apparent rise in lung cancer death rates was due to the improvement in diagnosis (Dorn, 1954).

If the difference in lung cancer death rates between England and Wales and the United States is merely the result of a difference in the level of diagnosis, then (*a*) British physicians are making this diagnosis in about twice as many men as actually have the disease, or (*b*) American physicians are missing about half the cases that actually occur in men, or (*c*) British physicians tend to err in one direction and American physicians tend to err in the other direction.

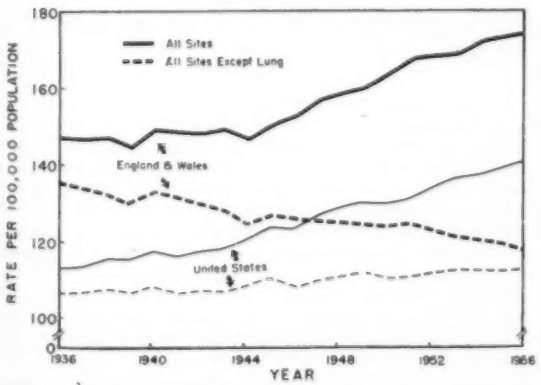

FIG. 3.—Male cancer death rates (standardized for age on 1940 U.S.A. population) for England and Wales and United States (U.S.A. figures for white males) in 1936–56.

Some other respiratory disease may sometimes be recorded as the cause of death when the patient actually died of lung cancer. However, among white males aged 50–64 in 1955 in the United States, 9,789 deaths were attributed to lung cancer and only 9,112 deaths were attributed to all other respiratory disease combined (including pulmonary tuberculosis, influenza, pneumonia, etc.). Even if half of the deaths attributed to other respiratory diseases were actually due to lung cancer, it would not account for the entire difference in lung cancer deaths between England and Wales and the United States.

Fig. 3 shows the death rates from cancer of all sites and cancer of all sites except the lung for males in the two countries for the period 1936 to 1956. For comparability, the rates have been standardized for age on the age distribution of the population of the United States in 1940. The figures for the United States are for white males only.

The reported total cancer death rate (age-standardized) increased in the United States during this entire period of 20 years and increased in England and Wales from 1944 onward. In all of these years the rate was far higher in England and Wales than in the United States. The interesting fact shown on this chart is that when lung cancer is *excluded* the rate went steadily down in England and Wales from 1936 to 1956 while it rose slightly in the United States during the same period of time. This may be a true picture of what actually occurred. On the other hand, it may be a clue to a part of our puzzle.

We have reason to believe that cure rates for cancer of some sites improved somewhat in the United States during this period of time (Hammond, 1957). We have no reason to believe that there was a real increase in incidence rates of cancer of sites other than lung. When cancer kills, it is usually widespread in the body at the time of death, and in many cases it is by no means easy to ascertain the site of origin of the disease. These facts suggest the following hypothesis. When cancer is present at the time of death both in the lungs and in other parts of the body and the primary site cannot be determined with accuracy, there is a tendency in England and Wales to record lung as the primary site and a tendency in the United States to record some other organ as the primary site.

This hypothesis, if true, would account for a part of the difference in lung cancer death rates between the two countries; but it would not explain why the total cancer death rate among males is far higher in England and Wales than in the United States. One would further have to assume that cancer (regardless of primary site) is either over-reported as a cause of death in England and Wales or under-reported in the United States, or both.

Conclusions

There must be some explanation for the fact that reported lung cancer death rates for men are about twice as high in England and Wales as in the United States and the rates for females are about one and a half times as high in England and Wales as in the United States.

Data at present available do not support the hypothesis that a substantial part of this difference can be attributed to differences in amount of cigarette smoking among males and females in various age groups in the two countries. However, more detailed information on smoking habits and on the chemical composition of smoke from cigarettes in the two countries is needed before this can be definitely established.

While it is possible that some of the difference in lung cancer death rates may be due to factors associated with urbanization—for example, air pollution or occupational

exposures—available evidence does not suggest that these factors can account for a large part of the difference.

Factors related to climate and to the incidence rates of bronchitis cannot be ruled out of consideration. There is too little evidence at present to draw any conclusions concerning this point.

It is within the realm of possibility that a part of the difference is due to under-reporting of lung cancer as a cause of death in the United States or to over-reporting of lung cancer as a cause of death in England and Wales, or both.

Clearly, the data at present available are insufficient for any definite conclusions to be drawn on why reported lung cancer death rates are so much higher in England and Wales than in the United States. However, it does not appear likely that any single one of the factors discussed above is sufficient in itself to account for all of the difference. This suggests that the difference may be due to an interaction of two or more of these factors. For example, bronchitis, which appears to be more common in England and Wales than in the United States, may increase the susceptibility of individuals to the carcinogenic effect of tobacco smoke or air pollution.

Summary

In 1955 the lung cancer death rate reported in England and Wales for males was 2.1 times as high as reported in the United States and for females 1.6 times as high. A difference of this order of magnitude has existed in male rates for several decades; while prior to 1949 there was only a small difference in the female rates.

Among both males and females in the middle- and old-age groups there are proportionately more cigarette smokers in the United Kingdom than in the United States. On the other hand, at the present time the number of cigarettes consumed per smoker per day is higher in the United States than in the United Kingdom. The proportion of male cigarette smokers who inhale appears to be approximately the same in the two countries. In the United States the average length of the remaining butt after a cigarette is discarded is about 31 mm.; about 5% are 45 mm. or longer and about 9% are under 20 mm. in length. In the United States in 1957 the main stream smoke of the average cigarette contained about 2.6 mg. of nicotine and 42.8 mg. of of tar. More recently, cigarettes with a relatively low content of nicotine and tar have become increasingly popular in the United States.

Data at present available do not support the hypothesis that a substantial proportion of the difference in lung cancer death rates between the two countries is attributable to differences in the use of cigarettes. However, more detailed information on smoking habits and on the chemical composition of cigarette smoke in the two countries is needed before this can be definitely established.

In both countries the lung cancer death rate of smokers, as well as the lung cancer death rate of non-smokers, is higher in urban areas than in rural areas. The difference in this respect is reported to be far greater between Liverpool and rural areas of Wales than between large cities and rural areas in the United States. However, Merseyside (which includes Liverpool) has a higher male lung cancer death rate than any other region in England and Wales, so it cannot be considered as typical of the country as a whole. While it is possible that some of the difference in lung cancer death rates may be due to factors associated with urbanization—for example, air pollution or occupational exposures—available evidence does not suggest that these factors can account for a large part of the difference.

The reported death rate from cancer, exclusive of lung cancer, declined steadily from 1931–5 to 1956 in England and Wales but rose slightly in the United States during the same period of time. It is possible that differences in the diagnosis and recording of causes of death may account for a part of the difference between reported lung cancer death rates in the two countries.

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PARAPLEGIA FOLLOWING EPIDURAL ANAESTHESIA

BY

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We present a case of paraplegia that occurred after an epidural anaesthetic. So far as we can ascertain no similar case has been reported.

Case Report

A man aged 76 was admitted to hospital on March 14, 1957. He complained that for seven days before admission he had pain in his left-sided femoral hernia, with associated central abdominal intermittent pain. Two days before admission the pain in the rupture and the abdomen had become more severe and he started to vomit profusely. His bowels, usually regular, had been opened inadequately on the days before admission, and since the onset of the severe intermittent pain he had had no bowel movement nor had he passed flatus. The rupture appeared first six months before admission, but was small, and he had experienced no discomfort in it before.

In May, 1956, the patient was first seen at Ashford Hospital in congestive heart failure with pulmonary oedema. He was admitted to hospital and his cardiovascular condi-

tion was stabilized. After his discharge he once more developed gross congestive failure with bilateral bronchopneumonia. He refused to go to hospital, but shortly afterwards developed acute cor pulmonale, necessitating his admission. He was at this time grossly oedematous, and his neck veins were distended up to the angle of the jaw in the erect position. The fluid in his serous cavities was tapped, and his legs were drained with Southey's tubes. He made a surprisingly rapid recovery and was able to return home. During the ensuing months at the beginning of 1957 he was gradually deteriorating. His blood pressure, recorded at the time of his first admission to hospital, was 140/70.

On examination the patient looked extremely ill and dehydrated, with a blood pressure of 110/82 and a pulse rate of 100. He was slightly cyanosed, particularly the tip of his nose, hands, and feet, and was dyspnoeic at rest. His neck veins were engorged to about an inch (2.5 cm.) above his sternoclavicular joints and he had rales over both lung fields. His liver was palpable two fingerbreadths below the costal margin and was tender. The abdomen was not distended, nor was there visible peristalsis, but bowel sounds were increased. In his left groin there was a tender irreducible femoral hernia. The skin over the hernia and over the inguinal ligament was reddened. Rectal examination revealed only faeces. He had oedema of his sacrum and of the legs below the knees. His haemoglobin was 70%. He was given a blood transfusion of 1 pint (570 ml.), and two hours later was considered to be fit for surgery. It was decided that he should have an epidural anaesthetic.

Premedication.—Fifty minutes before the operation the patient was given pentobarbitone 50 mg., atropine 0.6 mg., and pethidine 75 mg.

Anaesthetic Technique.—His blood pressure was 90/50. Before the epidural anaesthesia was induced a Gordh needle was inserted intravenously. He was turned on to the left side with a head-down tilt of about 5 degrees. The skin overlying the lumbar region was cleaned with Bonney's blue and 70% spirit. The epidural space was easily identified between L 1 and 2 by means of a modified Dogliotti technique using a 2-ml. syringe filled with air. As there was no backflow of cerebrospinal fluid, 27 ml. of 1.75% lignocaine hydrochloride ("xylocaine") containing 1 in 300,000 adrenaline was injected slowly over five minutes into the identified space. The patient was left lying on his left side for several minutes. Immediately on the completion of the epidural anaesthesia 15 mg. of ephedrine hydrochloride was given intravenously and 15 mg. intramuscularly to prevent further hypotension. The patient was turned on to his back, and it was noted that seven minutes after the injection of the local anaesthetic he was still able to move his legs to such an extent that he was requested to lie as still as possible during the course of the operation. Intermittent injections of ephedrine hydrochloride, to a total dose of 100 mg., were given during the course of the operation, maintaining his systolic blood pressure between 80 and 90 mm. Hg.

Operation.—A vertical incision was made and the McEvedy approach adopted. The peritoneal cavity was opened and a loop of ileum was seen to enter the hernial sac. This was reduced with some difficulty, and the bowel was found to be gangrenous and non-viable. Eight inches (20 cm.) of ileum was resected and continuity restored by end-to-end anastomosis in two layers. The hernial sac was transfixed and ligated and the wound closed in layers.

During the whole course of the operation the patient remained conscious and was talking, but was not felt to move his legs at all after being wheeled into the theatre. On completion of the operation his blood pressure was 100/50 and he had been given 250 ml. of blood during its course. The time taken to complete the operation was 45 minutes. He was returned to the ward in the head-down position, which was maintained until his blood pressure was stabilized at over 100 mm. Hg.; this is the practice at the hospital. Immediately on return to bed his pressure was recorded as 138/74, and during the night fluctuated between 96/48 and 140/74. Unfortunately it was not noted whether he had moved his legs at all during this time.

Post-operative Course

On the following morning his general condition was satisfactory apart from slight dehydration. He had no pain, but complained that he was unable to move his legs. On examination his general condition was good, his abdomen was soft, with audible peristalsis, and his bladder was not distended. He could not move either leg, although he had very slight movement of the sartorius and plantar flexors of the right foot and slight movement of the long flexors of his left toes. The knee- and ankle-jerks were absent and no plantar responses were elicited. He had impairment of pin-prick up to the level of the umbilicus, but fine and coarse touch were not impaired, nor were his postural and vibration senses. A diagnosis of anterior spinal artery syndrome was made.

During the ensuing days there was very slight recovery of his left foot in that he developed some eversion, and he also had scattered areas of recovery to pin-prick in both legs. His bladder was treated with an indwelling catheter and became automatic after about five weeks. His bowels were emptied with the aid of enemata. His legs became oedematous and he developed pressure sores over both heels and his sacrum. These healed with ultra-violet light and infra-red irradiation and massage of the surrounding areas, but recurred in the terminal stages.

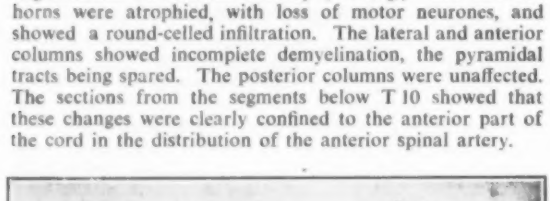
His congestive heart failure was treated with a salt-free diet, digoxin, and mersalyl, and the anaemia, which on occasion reached a level of 50% haemoglobin, was treated with intravenous iron and blood transfusions. He also had recurrent attacks of subacute intestinal obstruction relieved by enemata. Two months after the onset of the paraplegia he developed a urinary infection with *Escherichia coli* and, later, a proteus infection which resisted all forms of treatment. His blood urea gradually rose and his general condition deteriorated; finally he became uraemic, with a blood-urea level of 100 mg. per 100 ml., and he died on December 13, 1957.

Post-mortem Findings

The body was that of a small, thin old man with oedema of the legs and sacral and gluteal pressure sores. The heart was slightly enlarged, weighing 300 g. The myocardium was free from scarring, the valves were competent, and the coronary arteries showed only a mild degree of atheroma. In the left lower lobe pulmonary artery there was a recent pulmonary embolus occluding the lumen. The lungs were small and collapsed, with gross bullous emphysema, most marked on the left, the largest bulla being the size of a tangerine. The liver, spleen, and pancreas were normal. The kidneys were slightly enlarged, the capsule of the left stripping easily, but that on the right stripped to reveal multiple abscesses. The left renal pelvis was capacious, leading to a dilated ureter. On the right side, section of the kidney revealed a pyonephrosis with considerable excavation of the parenchyma. The ureter, too, was dilated, with peri-ureteric fibrosis and mucosal ulceration, the dilatation stopping abruptly at the bladder wall. No stone was found in the urinary tract. The bladder, distended with turbid infected urine, had a thin trabeculated wall with multiple diverticula. The prostate was small and adenomatous. The alimentary tract showed no abnormality, the site of the anastomosis being identified with difficulty by the presence of few silk sutures. The brain was normal; no vascular disease of the vessels was seen. No abnormality was found in the spinal canal. There was no evidence of arachnoiditis; the only comment was that the lumbar swelling was smaller than normal.

Sections were taken at each segmental level in the cord and stained with Ehrlich's haemotoxylin and eosin and methasol. The pia-arachnoid was normal. Apart from

mild hyaline change in some of the veins and a short segment of medial thickening in the anterior spinal artery, no other vascular abnormality was found. The spinal cord from T 10 downwards showed a bilaterally symmetrical degeneration of uniform severity (see Fig.) The anterior horns were atrophied, with loss of motor neurones, and showed a round-celled infiltration. The lateral and anterior columns showed incomplete demyelination, the pyramidal tracts being spared. The posterior columns were unaffected. The sections from the segments below T 10 showed that these changes were clearly confined to the anterior part of the cord in the distribution of the anterior spinal artery.



Transverse section of spinal cord at the level of S 2, showing the symmetrical degeneration of the cord in the distribution of the anterior spinal artery. (Stained with methasol. ×6.)

Discussion

In this patient the choice of anaesthetic was based on the following considerations. The state of his cardiovascular system, together with the bronchopneumonia and severe emphysematous changes in his lungs, made it appear wiser to use some form of local anaesthetic. Also, there was the added hazard of inhalation of vomit which might well have occurred under general anaesthesia. The choice of local anaesthetic in our minds lay between subcutaneous infiltration and local nerve block, spinal or epidural. It was thought that the inflammatory changes present over the hernial sac and inguinal ligament were sufficient to make it inadvisable to use either the subcutaneous method or the local nerve block. Spinal anaesthesia is less often used in this country, and was rejected because of its risk of nervous sequelae. Epidural anaesthesia was used because of the advantage of obtaining a pure sensory block, thus obviating any respiratory embarrassment due to motor paralysis. In addition, the unexplained bronchodilator effect of the epidural anaesthetic would be beneficial to this patient's emphysematous condition (Bromage, 1954). These advantages were considered to outweigh the risk of hypotension that might result. It was possible to prevent a further fall in blood pressure by using a moderate dose of ephedrine, without having to resort to the stronger vasopressor drugs, such as noradrenaline.

From the clinical picture and the pathological and histological findings our patient was quite clearly suffering from the syndrome of anterior spinal artery occlusion. Other causes for the paraplegia that might be related to the anaesthetic technique, such as disk protrusion, extradural haemorrhage, and haematomyelia, were considered. The disk protrusion could have been caused by flexion of the spine during the induction of anaesthesia. Extradural haemorrhage either spontaneously occurring through twisting or straining (Schultz *et al.*, 1953) or traumatic in origin by damage to the spinal veins, may have resulted. Haematomyelia may have been caused by damaging the cord. All these possible events were excluded on the pathological findings. Further consideration must be given to the possibility that an accidental spinal anaesthesia was induced, causing the paraplegia. On clinical grounds this was excluded because the patient was able to move his legs some while after the epidural anaesthetic was given. But Sykes (1958) points out that this sign is not infallible, and a spinal anaesthesia may have resulted through seepage via a small dural puncture. A total spinal anaesthesia can be excluded on the grounds that there was no respiratory paralysis, no profound fall in blood pressure, or, as would be expected with a quantity of anaesthetic of this magnitude, no loss of consciousness and no pupil signs developed.

Two further causes of the neurological damage—chemical contamination of the spinal cord and infection—have to be excluded. The former can be ruled out because no chemical agent was used to sterilize the anaesthetic solution or the instruments. The possibility of the introduction of infection does not seem likely, because of the aseptic technique adopted. This consisted of autoclaving drums (30 minutes at 20 lb.), the use of sterile gowns and gloves, and the preparation of the skin over the lumbar region with Bonney's blue and 70% surgical spirit. Clinically, the onset of the paraplegia was rapid enough to make it unlikely that there was an infective cause. Furthermore, the absence of adhesive arachnoiditis at post-mortem examination ruled out both these possibilities.

It should also be mentioned that cases of paraplegia have been reported as occurring after general anaesthesia. These were due to either a thrombosis following hypotension (Ciliberti, 1948; Ditzler and McIver, 1956) or to air embolism during the induction of an artificial pneumothorax (Wikler *et al.*, 1937) or injury to the pulmonary vein during thoracotomy (Thomas and Dwyer, 1950).

Finally, the epidural anaesthetic as the prime cause of the paraplegia must be discussed. Because of the known hypotensive action of an epidural anaesthetic, precautions were taken at the onset to prevent a severe fall in blood pressure. However, a systolic pressure between 80 and 100 mm. Hg might well have been too low to maintain an adequate blood supply to the cord with his already failing circulation. This might possibly have led to stasis and subsequent thrombosis in the vessels. We are aware of a similar case where a temporary paraplegia resulted from the use of an epidural anaesthetic to provide controlled hypotension for a total parotidectomy (Massey Dawkins, 1958, personal communication).

The stasis might have been produced by compression of the spinal vessels by the volume of local anaesthetic solution introduced into the epidural space. This almost certainly can be excluded, for there is easy dispersion of the solution through this space and the paravertebral foramina. Furthermore, it would be more likely for the posterior spinal vessels to be affected rather than the anterior.

Many authorities have suggested that the local anaesthetic itself may cause permanent neurological damage (Payne and Bergentz, 1956). Frumin *et al.* (1953) have produced strong experimental evidence that the anaesthetic solution will diffuse from the epidural space into the spinal canal. Most of the local anaesthetic drugs have been incriminated in producing cord damage, but, so far as we can ascertain, no report following the use of lignocaine hydrochloride has been made. However, it would seem likely that this too might have a similar action on nervous tissue. From the clinical signs and the pathological findings of damage solely in the distribution of the anterior spinal artery, and lack of arachnoiditis, it is unlikely that this was a direct toxic action of the drugs on the cord.

A further possible cause is the vasoconstrictor action of adrenaline. The solution used during the anaesthetic procedure contained 1 in 300,000 adrenaline. Ruben *et al.* (1948) reported the spinal anaesthetic effects in the human following the use of vasoconstrictor substances alone. Priddle and Andros (1950), using adrenaline solution of 1 in 2,500 dilution, produced hypoalgesia in the saddle area

following intrathecal injection. The explanation may be that this is an anoxic effect due to the vasoconstrictor action. However, those workers suggest that adrenaline itself has a direct effect on nerve conduction, and Forbes *et al.* (1933) and Fog (1939) showed that there was no arteriolar constriction following direct application of adrenaline to the pia mater. Nevertheless, the clinical and pathological findings of nervous damage confined to the anterior spinal artery distribution strongly suggest that some block, albeit transient, occurred in this arterial supply, and we believe that adrenaline could have caused such a transient block.

It is appropriate at this stage to discuss briefly the significant points concerning the arterial anatomy in the region. The cord derives its supply from three vessels, one anterior and two posterior. The anterior spinal artery arises as a branch from each vertebral artery. These unite at the level of the foramen magnum to form one vessel, which runs down the whole length of the cord in the midline. This vessel, through multiple small branches, supplies the lateral column and the anterior grey and white columns. The posterior pair of arteries arise from the posterior inferior cerebellar or from the vertebral arteries, and run down the whole length of the cord in relation to the posterior nerve roots supplying the posterior third of the cord. The anterior spinal artery is virtually an end-artery receiving significant collaterals only at the level of T 1 and T 11. The posterior spinal arteries in contrast have numerous collateral vessels freely anastomosing over the posterior part of the cord. It is obvious that interference with the blood supply derived from the anterior artery will give rise to ischaemic changes in the anterior two-thirds of the cord; whereas occlusion of the posterior vessels is less likely to produce permanent changes because of their free anastomosis.

The syndrome of anterior spinal artery thrombosis was first clinically diagnosed by Spiller (1909). Since his description many cases of this syndrome have been reported. The following aetiological factors have been blamed: interference with the blood supply through aortic compression, thrombosis, aneurysm and co-arctation, syphilitic thrombosis, arteriosclerosis, and simple vascular spasm; as well as trauma, both direct and indirect, and compression due to tumour or disk (Steegmann, 1952; Peterman *et al.*, 1958). Still, there are numerous reports of cases where no causative factors were found.

The lesion produces a definite clinical picture of destruction in the area supplied by this anterior spinal artery. Most commonly the areas affected have been the lower cervical and the thoraco-lumbar regions. Our case was typical of this syndrome, and further elaboration is unnecessary.

Summary and Conclusions

A case of the anterior artery syndrome following epidural anaesthesia is presented.

We have discussed the possible causes of the anterior spinal artery syndrome in this case, and have come to the conclusion that no single factor was responsible. We believe that there are possibly two causes: firstly, the relative hypotension imposed on the patient's already failing peripheral circulation; and, secondly, the vasospastic action of the adrenaline. From the histological findings that thrombosis had not occurred in this artery, we have to assume, therefore, that the occlusion was of transient nature. Unfortunately, this was of sufficient duration to produce permanent changes in the anterior part of the cord due to ischaemia. His arterial supply was probably already decreased owing to his heart failure, and therefore interference with this supply was disastrous. Finally, it should be mentioned that cases of spontaneous occlusion of the anterior spinal artery have been reported and that, although unlikely, this might have been purely coincidental.

We thank Professor R. S. Pilcher for permission to publish this case and for his criticism and advice. Also we are indebted to Dr. Massey Dawkins for his helpful discussion. We thank Dr. W. Blackwood for his interest in the sections of the cord and Dr. D. H. Mills, of Ashford Hospital, for details of the patient's previous history.

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NEUROLOGICAL COMPLICATIONS OF EPIDURAL ANAESTHESIA

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Epidural anaesthesia is generally regarded as being safe, easy to carry out, and free from complications. Many authors, in reviews of its use in thousands of cases, record very low mortality and morbidity. The technique of the injection involves the introduction of a lumbar-puncture needle between two spinous processes into the epidural space. In this situation a negative pressure exists, as demonstrated by the suction effect upon a drop of saline placed on the hilt of the needle. 2 ml. of 2% procaine solution is injected, and if during the next 10 minutes no reaction occurs a further 25–30 ml. is introduced.

Two cases are described in which neurological complications of a very serious nature appeared after epidural anaesthesia with the technique described above.

Case 1

A 26-year-old housewife had a caesarean section at another hospital four months previously, and because of a history of bronchial asthma epidural anaesthesia was decided upon. No untoward incidents were noted at the time of operation, but the same day she complained of headache and double vision, the latter passing off in a few hours. Headache and a feeling of intracranial pressure persisted for a few weeks, and at this time the patient noticed gradually increasing difficulty in walking. Weakness in the legs, first right and then left, became progressively more pronounced until a few weeks later she was quite unable to walk. Impairment of sphincter control followed some weeks later and became complete. She was readmitted to hospital, where lumbar puncture revealed partial manometric block. On myelographic examination the oil column was held up at D 11.

The patient was transferred to this hospital and showed paralysis of the lower limbs, complete apart from feeble flexion of the right knee. The muscles were hypotonic, the right knee-jerk and abdominal reflexes were absent, and there was left bilateral ankle clonus; sensation, both

superficial and deep, was much impaired up to D 11. The bladder was paralysed, with retention of urine. In the hope that the cause of the paraplegia might conceivably be a local constrictive arachnoiditis at the level of the myelographic block, the patient was transferred to the neurosurgical department. Laminectomy at D 11–L 1, performed by Dr. Herzberger, revealed gross arachnoiditis, the cord being embedded in an opalescent jelly-like mass which extended as far as could be seen cranially and caudally. The condition of the patient was not influenced by the decompression, and she remained permanently crippled.

Case 2

A 66-year-old man was admitted for surgical treatment of vesical calculi. Five years previously he had undergone a spinal operation for a tumour at D 12, which proved to be a chordoma. His symptoms at the time were pains in the back and legs, and these were relieved by the operation. Up to the time of this second admission he had been entirely free of any complaints referable to the lower limbs and there were no objective neurological residua. Transurethral lithothomy under epidural anaesthesia passed off without incident.

A month later a second-stage operation was performed with transurethral resection of the prostate, again under epidural anaesthesia (L 2–3). The patient was seen in consultation on the following day because power in the legs had failed to return. He was found in good general condition, with paralysis of ilio-psoas and quadriceps muscles bilaterally; muscles below the knees were active. Deep reflexes were absent and sensation was reduced below the level of L 3. With this distribution of paralysis it was thought less likely that there had been inadvertent intrathecal injection than that for some reason the roots at the level of the injection had failed to recover from the anaesthesia. During the succeeding weeks there was only minor improvement until the patient died from cardio-pulmonary complications.

At post-mortem examination the remains of a nodular growth were seen at D 12 with an intrathecal extension the size of a pea. Considering the time relationship as outlined above, it was not thought that this tumour played a part in the production of the post-operative paralysis.

Discussion

The mechanism of production of the cord changes described above must remain to some extent speculative. Although sepsis cannot be ruled out, it is probably an unlikely explanation. In Case 1 there was nothing to suggest an acute post-operative meningitis; in Case 2 the complications were immediate, but limited to the anatomical segments innervated from the level of the injections. Taking into consideration the headaches and double-vision experienced by the first patient on the day of operation, it seems difficult to exclude the likelihood that the arachnoiditis and cord changes were a direct expression of a chemical meningo-myelopathy resulting from inadvertent injection of the anaesthetic into the subarachnoid space. Since complications of this nature are known (Payne and Bergentz, 1956) to follow deliberate intraspinal anaesthesia where total quantities of only 40 mg. of procaine are employed, it is not unreasonable to suppose that they may result from the introduction of some portion of the total of 500 mg. commonly employed in epidural anaesthesia. The clinical course of the case described by Payne and Bergentz resembles very closely that of our Case 1. Progressive paraplegia began seven days after the anaesthesia and became complete in two weeks. These authors quote experimental work on dogs which demonstrated the appearance of local arachnoiditis following spinal anaesthesia in clinical doses. Haxton (1956) mentions an experience of his own in which an intrathecal injection of phenol was unwittingly given when the intention was to place the needle paravertebrally, let alone epidurally.

Local hypersensitivity of nerve roots to the anaesthetic reagent or chemical changes or impurities may perhaps be invoked to account for the persistent paralysis in our second case.

General hypersensitivity to the anaesthetic agent would seem to be an unlikely explanation, as a reaction of a more widespread nature might be expected. In this connexion it is of no small interest that in the course of our investigation into the complications of epidural anaesthesia prompted by the above experiences it was discovered that the only two cases of cardiac arrest during anaesthesia which had occurred in this hospital happened while this method was being employed and before the operation itself had started.

Both patients were in good general health and were admitted for elective operations. In one, 15 ml. of anaesthetic was injected, when the heart suddenly stopped. In the second it was thought that a portion of the anaesthetic may have been introduced intrathecally. The needle was partially withdrawn and the anaesthesia proceeded with, as there were apparently no reactions; however, a few minutes later, as the skin was being incised, the pulse stopped. Cardiac massage succeeded in restoring the pulse in both cases, and one patient made a reasonable recovery in the course of some weeks; the other died in coma. In these two cases one may postulate the existence of hypersensitivity to procaine, though a reaction to the flooding of the cerebrospinal fluid with large quantities of anaesthetic cannot be ruled out.

Though the numerical incidence of complications following epidural anaesthesia as seen in this hospital is low (4 out of 200 lumbar and several hundred sacral injections) their seriousness and their tragic consequences suggest that this method should be employed only after very careful consideration. Although this method is claimed to be safe, we cannot be sure that all complications are indeed brought to light or even thought of when they are of delayed onset. It seems that Walshe's (1956) criticisms of intrathecal anaesthesia may be equally pertinent when applied to epidural anaesthesia.

Summary

Neurological complications are described in two patients following epidural anaesthesia: they are believed to have been due to a local chemical meningomyelopathy or neuropathy.

Reference is made to two cases of cardiac arrest attributable to this technique.

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The Third International Congress of Photofluorography was held in Stockholm last month under the presidency of Professor CARL WEGELIUS. It was attended by 600 delegates from all over the world. The papers read at the Congress gave clear evidence that here is a field in a ferment of activity. Important advances such as alkali halide intensifying screens and new methods of film processing suggest that up to a tenfold reduction in received radiation may be expected from technical innovations. With modern coning and filtering of the *x*-ray beam the dose to the skin and gonads in taking a single chest film can be reduced to less than the weekly permitted safe dose for radiographers who spend their whole working lives exposed to *x*-radiation, while image intensification can increase the brightness of the screen picture a thousand times. This allows screening at very low radiation levels, a degree of brightness that makes dark adaptation unnecessary, and the making of permanent multiple or cine photographic records of physiological or pathological functions for analysis at leisure in "slow motion." A special edition of *Excerpta Medica* summarizes most of the papers presented at the Congress.

THROMBOSIS OF THE MAJOR PULMONARY ARTERIES

BY

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The clinical syndromes of pulmonary artery thrombosis are less well known than those of acute pulmonary embolism. Thrombosis may involve the secondary and tertiary branches, or the main right or left arteries and pulmonary trunk. Thrombosis of these larger vessels is uncommon. It is, nevertheless, being increasingly reported as a cause of striking clinical deterioration in a wide variety of predisposing illness (Ring and Bakke, 1955).

Pathogenesis

There are two main ways in which such thrombi can arise: (a) primary thrombi, and (b) secondary to pulmonary emboli. Carroll (1950), Hanelin and Eyler (1951), and Magidson and Jacobson (1955) have reported groups of cases, many showing a history of embolism or leg-vein thrombosis. The frequent finding of thrombi in the right heart or systemic veins led Brenner (1935) and Belt (1939) to conclude that most pulmonary artery thrombi are embolic in origin. Belt demonstrated by necropsy studies the sequence of changes which may follow embolism. He cites the elongated shape and characteristic mode of attachment of the thrombus, the lack of local vascular lesions, and the finding of thrombi of similar age in the peripheral veins as evidence for an embolic origin of many of these thrombi.

In six of seven cases described by Keating *et al.* (1953) there was evidence that the thrombi had arisen *in situ*, either from the direct involvement of the vessels by primary lung disease, or as a result of disease of the vessels themselves. All their patients died in acute cor pulmonale. Advanced tuberculosis and anthracosilicosis were predisposing illnesses in the patients reported by Savocool and Charr (1941), who were able to trace the thrombosed vessels into the affected areas. The condition may develop in congenital and acquired heart disease, pulmonary hypertension and the altered dynamics of vascular shunts being predisposing factors. Thus, Kampmeier (1934) describes the condition with mitral stenosis, while interventricular septal defect (Bryson, 1949), cor triloculare (Cunningham, 1948), Fallot's tetralogy (Rich, 1948; Ring and Bakke, 1955), persistent ductus arteriosus (Whitaker, Heath, and Brown, 1955), and in particular atrial septal defect (Bedford *et al.*, 1941; Trounce, 1953; Campbell, Neill, and Suzman, 1957) may be associated with widespread pulmonary artery thrombosis. When heart disease is present a vicious circle may develop in which thrombosis further increases the strain on the heart and predisposes to further extension of thrombosis.

Other factors can play a part in pathogenesis. Malignant disease may directly involve the pulmonary arteries, or cause widespread obstruction by multiple tumour emboli (Brill and Robertson, 1937). Multiple venous thromboses in association with malignant disease may involve the pulmonary vessels and progress despite adequate anticoagulant therapy.

Abnormal blood conditions such as primary or secondary polycythaemia (Hodes and Griffith, 1941; Carroll, 1950), sickle-cell disease (Yater and Hansmann, 1936), and cryoglobulinaemia (Cugudda, 1952) will at times predispose to pulmonary artery thromboses.

Although the pathogenesis of thrombosis is usually established by consideration of the post-mortem appearances together with the clinical findings, the distinction between post-embolic and autochthonous thrombosis may not be possible even at necropsy.

Present Investigation

Now that prolonged anticoagulant therapy is possible, it is important to recognize the syndromes of chronic thrombotic obstruction of the pulmonary vessels during life. The purpose of this paper is to present the findings in 19 cases in which thrombosis of the major pulmonary arteries was confirmed at necropsy. They illustrate the wide variety of predisposing illness, the varying factors in pathogenesis, and the types of clinical illness which result.

Sixteen of the cases were chosen from 1,673 consecutive post-mortem examinations carried out at St. George's Hospital, London, during the period January, 1952, to July, 1956. Three were observed subsequently. In all cases thrombosis affected the pulmonary trunk or the main left or right branches proximal to the hilum. Patients in whom major clinical embolism was the immediate cause of death were excluded. In the patients reported here, at least three weeks had elapsed since any major embolic episode; at necropsy the thrombi were organized and adherent in all but three of the cases.

Clinical Features

The ages in the present series range from 22 months to 78 years, 14 patients being over 50 years of age at the time of death. The clinical and pathological findings are summarized in the Table. Cases are divided into two main groups, Figs. 1, 2, and 3 illustrating the appearances and extent of the thrombotic obstruction of post-embolic and autochthonous thrombosis.

Group 1. — In six patients there was a history of frank pulmonary embolism during the preceding three months. In two further cases pulmonary embolism produced only minimal clinical changes, their possible significance in the resulting illness being recognized only in retrospect.

FIG. 1.—Case 1. Post-embolic thrombosis of the pulmonary arteries. A major embolic episode occurred three weeks before death. Smooth adherent thromboembolus occludes much of the lumen of both the right and left pulmonary arteries. Many of the secondary branches are affected.

Group 2.—Of the nine examples of presumed *in situ* thrombosis, six had chronic heart disease and three emphysema. There was no definite history of thrombosis of the leg-veins, nor did necropsy reveal thrombi in the peripheral veins of similar age to the pulmonary artery thrombi. In the remaining two patients there were no progressive cardio-respiratory symptoms; at necropsy the pulmonary thrombi were pale, friable, and only lightly adherent. Their appearances suggested that they had formed terminally.

The most frequently observed clinical features were increasing dyspnoea, cyanosis, and right heart failure. Dyspnoea was severe in 14 of the 19 cases, being often progressive and intractable, and at times proportionately more severe than the clinical and radiological findings suggested. Nevertheless, both dyspnoea and cyanosis were on occasion absent or minimal.

The cardio-respiratory symptoms of many of the underlying conditions make it difficult to appreciate any additional changes due to pulmonary artery thrombosis. A review of the clinical findings in this series did, however, reveal a number of features thought to be associated with the increasing thrombotic obstruction. These were the sudden onset of acute cor pulmonale with striking coldness of the extremities (Cases 9, 10, 11, and 14), paroxysmal epigastric pains (Case 11), the development of a prolonged generalized systolic murmur (Case 5), the onset of visible pulsations in the pulmonary area with greater accentuation of the second sound (Case 15), and possibly the development of paroxysmal cardiac arrhythmias (Case 12).

FIG. 2.—Case 13. *In situ* thrombosis of the pulmonary arteries. The arteries contain grey adherent laminated thrombus. Many of the peripheral vessels are occluded.

FIG. 3.—Case 11. Bilateral thrombosis of the pulmonary arteries. The relationship of the thrombus to atheroma of the vessels is seen in the right branch (below).

Electrocardiograms were taken in 11 patients and serial records were available in nine of these. There were no constant changes, the findings in general remaining those of the underlying conditions.

In 15 of the cases radiographic examination was made during the last three weeks of life, serial records being made in nine. In one of the two cases in which screening was carried out there was expansile pulsation of the proximal portions of the dilated right pulmonary vessels which diminished abruptly distally (Case 14). The most frequent finding (11 patients) was conspicuous enlargement of the pulmonary vessel shadows. In only three of the cases could progressive ischaemic changes of the peripheral lung fields characteristic of pulmonary artery obstruction be recognized. In some cases this was because the lung fields were obscured by the changes of effusion or infarction; in several, however, no changes of pulmonary artery obstruction were detected even though serial radiographs were compared. A further change noted (Case 13) was that of increasing accentuation of the pulmonary vessel outline due to diminished pulsation of the affected area.

The patients showed three types of clinical course. Cases 1, 2, 3, 4, 5, and 8 showed episodes of clinical pulmonary embolism, often repeated, with subacute cor pulmonale. In Cases 9, 10, 11, and 14 the post-mortem appearances suggested that the pulmonary artery thrombi had been present for some weeks, since they were well organized and firmly adherent. Nevertheless, few symptoms had resulted until the patients suddenly developed acute cor pulmonale. A gradually worsening chronic cor pulmonale was observed in one patient only (Case 6). Death occurred from other causes before cardio-respiratory symptoms were at all severe.

Discussion

The patients in the present study illustrate both post-embolic and autochthonous thrombosis. This is in accord with the case reports of Ring and Bakke (1955) and Ball, Goodwin, and Harrison (1956), and suggests that both types may occur with comparable frequency. The distinction is of practical importance in drawing attention to the group of *in situ* thrombosis of the larger pulmonary vessels as a complicating event in chronic heart or lung disease. The present cases of group 2 include emphysema, mitral stenosis, and congenital heart disease. These patients showed a history of increasing cor pulmonale, often acute, rather than of recurring clinical pulmonary embolism.

The present findings also support the observations that the right artery is more often affected than the left (Savacool and Charr, 1941). Even when thrombosis is bilateral, they point out that older lesions may often be identified in the right branches with recent extension to the left. They suggest that this may be related to the differing anatomy of the blood vessels at the lung roots.

Diagnosis has seldom been established during life. The condition may, however, be strongly suspected when there is a history of venous thrombosis of the legs followed by cardio-respiratory symptoms. That the time interval before cardio-respiratory symptoms may be measured in years is illustrated by a number of striking case reports (Means and Mallory, 1931; Covey, 1943; Madigson and Jacobson, 1955). In none of the present cases did the time between leg-vein thrombosis and embolic symptoms exceed three months. We have under treatment a further case in which subacute cor pulmonale has developed three and a half years after deep femoral vein thrombosis and in which radiological changes suggest pulmonary artery obstruction. It is well recognized that the clinical features of pulmonary embolism may be minimal; their significance was overlooked in Case 6 of the present series.

The condition may also be suspected when there is unexplained deterioration in any of the known predisposing cardiac or respiratory illnesses. The present findings support the view that *in situ* pulmonary artery thrombosis is particularly liable to occur when local vascular disease is severe, advanced vascular pathological changes being present in seven of the nine examples.

There may be changes in the physical signs. Changing heart signs were noted in three patients and epigastric pains in one patient. Severe attacks of epigastric pain were a striking feature in the patients studied by Middleton (1943) and in two reported by Magidson and Jacobson (1955). Syncopal attacks related to acute embolic episodes may be observed (Ball *et al.*, 1956).

The condition may first be suspected radiologically. The characteristic changes have been described by Westermark (1948). These include right-sided heart enlargement, dilatation of the pulmonary artery proximal to the obstruction, with alteration of the vessel contour, and increased trans-

lucency of the lung fields distal to the obstruction. Keating *et al.* (1953) draw attention to the accentuation of the vessel outline due to diminished pulsations of the affected area. Three of the fifteen patients in the present series who had radiographs showed such changes, and screening was of assistance in a further case. Frequent and comparable radiographs in cases of cor pulmonale are of obvious value in the detection of the changes.

Electrocardiography did not suggest the diagnosis in the present cases, although the change to right-axis deviation from pre-existing left-axis deviation may be striking (Keating *et al.*, 1953).

The increasing use of angiography may confirm the diagnosis more often in the future. Obstruction to the major arteries has been demonstrated by this means (Carroll, 1950), and to the segmental vessels (Aitchison and McKay, 1956).

The present cases illustrate the variability of clinical effects attributable to massive pulmonary artery thrombosis. That these may be minimal is shown in Cases 6, 7, 8, and 18. This is in accord with evidence that in the experimental animal much of the pulmonary circulation may be obstructed without the development of progressive symptoms (Gibbon, Hopkinson, and Churchill, 1932), and with the necropsy findings in Cases 9, 10, 11, and 14, when virtually no progressive symptoms occurred until the patient suddenly developed acute cor pulmonale.

The most frequent clinical course was that of repeated embolic episodes or of an overwhelming acute cor pulmonale. Only one patient in the present series showed a slowly progressive chronic cor pulmonale. This type of illness may be the least frequent of the clinical syndromes of pulmonary artery thrombosis.

Clinical and Pathological Features of 19 Cases of Pulmonary Artery Thrombosis

Case No.	Age	Sex	History	Duration of Recent Symptoms	Predisposing Conditions	Thrombosis Site	Heart Weight	Lung Vessels		Lung Infarction
								Major Artery Atheroma	Arterioles	
					Group 1. Following Pulmonary Embolism					
1	48	M	Post-operative embolism. Femoral-vein ligation. Increasing dyspnoea and haemoptyses	3 weeks	Embolism	Bilateral	—	—	—	++
2	56	M	Cardiac infarction — progressive dyspnoea and haemoptyses. Death in congestive failure	9 ,,	Antero-septal infarction —mural thrombi	Left branch	720 g.	—	—	++
3	66	M	Venous thrombosis right leg. Pulmonary embolism. Spastic weakness right arm. Thrombosis left leg	5 ,,	Unsuspected hypernephroma. Multiple venous thromboses	Right ,,	540 g.	—	Intimal thickening	++
4	66	M	Venous thrombosis left leg. Pulmonary embolism. Left cephalic vein thrombosis. Recurring pleural effusion	3 months	Carcinoma left bronchus. Multiple venous thromboses	,, ,,	370 g.	—	—	—
5	45	M	Emphysema and cor pulmonale 3 years. Leg-vein thrombosis and embolism	3 weeks	Recent embolism left branch—old thrombosis of right branch	Bilateral	450 g.	++	Severe arterio-sclerosis	+
6	69	F	"Feverish chill" followed by dyspnoea on exertion and persistent tachycardia	3 months	Embolism. Death from peritonitis due to perforation	,,	360 g.	—	—	—
7	73	F	Hypertensive heart failure. Transient left apical chest pain. Re-admitted after insulin overdosage	3 ,,	Hypertensive heart disease. Diabetes. Prolonged coma	Left branch	420 g.	—	Intimal thickening	+
8	70	M	Fractured neck of femur—pinned. Increasing right hemiplegia post-operatively	3 weeks	Polycythaemia rubra vera. Hypertension	Bilateral	480 g.	—	,,	+
					Group 2. In Situ Thrombosis					
9	64	M	Chronic bronchitis and emphysema. Sudden acute cor pulmonale	24 hours	Emphysema	Right branch	330 g.	++	—	+
10	62	F	Parkinsonism 3 years. Kyphoscoliosis. Slight dyspnoea on exertion. Sudden acute cor pulmonale	8 weeks	,,	Bilateral	380 g.	++	Severe arterio-sclerosis	+
11	62	M	Chronic bronchitis, worse 1 year. Recent epigastric pains. Acute cor pulmonale	48 hours	,,	,,	—	+	,,	?
12	26	M	6 years' increasing dyspnoea. Recent right lower lobe "pneumonia." Congestive failure with fibrillation	3 months	Persistent ductus. Aortic coarctation	Right branch	650 g.	++	Moderate arterio-sclerosis	+
13	62	M	6 years' auricular flutter. Well controlled until 3 months before death	3 ,,	Atrial septal defect. Mural cardiac thrombi	Bilateral	750 g.	++	Severe arterio-sclerosis	++
14	52	M	Increasing dyspnoea with paroxysmal fibrillation. Sudden acute cor pulmonale	7 ,,	Lutembacher's syndrome	Right	630 g.	++	,,	++
15	39	F	16 years' mitral stenosis. Episodes of congestive failure	2 weeks	Mitral stenosis	Bilateral and pulmonary conus	555 g.	+	Arteriosclerosis. Fibrinoid necrosis. Elastica fragmentation	++
16	68	F	6 months' increasing dyspnoea. Acute cor pulmonale	6 months	,, ,,	Bilateral hilar. Thrombi red and not organized	600 g.	+	Severe arterio-sclerosis	+
17	68	F	2 years' congestive failure and fibrillation. Sudden acute cor pulmonale	3 days	,, ,,	Left	600 g.	+	Moderate arterio-sclerosis	—
					Group 3. Other Cases					
18	22 mths	M	3 days' fever and petechial rash	3 days	Pneumococcal septicaemia. Mastoiditis. Thrombus pale and not organized	Left branch	—	—	—	+
19	78	M	Cerebral vascular accident 3 weeks before death	3 weeks	Cerebral infarction. Prolonged coma	Bilateral	300 g.	—	—	+

Summary and Conclusions

Thrombosis of the major pulmonary arteries is being increasingly recognized as a complicating event in a variety of illnesses.

The clinical and pathological findings are summarized in 19 further examples. In eight cases thrombosis was consequent on previous pulmonary embolism, in nine the findings suggested that autochthonous thrombosis had occurred. In two cases the pathogenesis was not established with certainty.

The pathogenesis and clinical effects are briefly discussed. Many of the patients have severe disease of the heart or lungs. The variability of the clinical effects attributable to pulmonary artery thrombosis is stressed. In this series they ranged from minimal changes to sudden intractable right heart failure.

Although the clinical changes are often masked by the underlying illness, the diagnosis may be suggested by a history of thrombophlebitis or embolism, by the occurrence of new and unexpected clinical signs and symptoms in the course of one of the predisposing illnesses, and on occasion by the radiological appearances.

Some patients show an illness characterized by recurrent embolization ; in others the presence of thrombotic obstruction is virtually symptomless until the onset of acute cor pulmonale. Less frequently, the thrombosis gives rise to a chronic cor pulmonale.

Thrombosis of the major pulmonary arteries may therefore have to be considered in the diagnosis of any case of acute, subacute, or chronic cor pulmonale.

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"Extra Care Stops Falls" is the slogan adopted by the Royal Society for the Prevention of Accidents for this year's National Industrial Safety Week, which is to be held from September 29 to October 4. The theme forms the basis of a nationwide campaign directed to both managements and workers with the object of reducing the toll of industrial accidents, and particularly those associated with falls of persons. In 1956, 22,548 persons were absent from work as a result of injuries following falls, equal to 14.1% of all reported industrial accidents.

ANAEMIA OF UNCERTAIN ORIGIN IN INFANCY

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Severe anaemia in infancy and childhood is often seen at University College Hospital, Ibadan, Nigeria. In most cases anaemia occurs in association with conditions such as kwashiorkor, cancrum oris, tuberculosis, and chronic sepsis. Sickle-cell anaemia is also relatively common. However, many patients present, especially during the first two years of life, with severe anaemia unassociated with other recognizable diseases and not due to the sickle-cell gene. There has been much speculation about the aetiology and pathogenesis of anaemia in this latter group, and malignant tertian malaria and dietary deficiencies (chiefly protein and iron) have long been regarded as the most likely causal factors. Little has been done, however, to verify these speculations. We report here the results of investigation and treatment of 24 of these cases selected from 85 similar cases which occurred among 1,318 admissions to the children's ward during the period October, 1955, to June 30, 1956.

Case Selection.—In a busy ward with a very rapid turnover of cases, one cot was set aside and used exclusively for the investigation of children under 2 years of age with severe anaemia (haemoglobin, 5.9 g./100 ml. or lower). Sickle-cell anaemia and anaemia complicating some other illness were excluded. The 24 cases presented were those who were admitted into this cot.

Methods

Besides routine clinical examination the following were done: Tuberculin-testing by the Heaf technique was routinely performed and the majority of children had an *x*-ray examination of the chest and wrists. Haemoglobins were estimated, using Keeler M.R.C. grey wedge photometers (100% = 14.8 g./100 ml.). Thin blood films were stained with Leishman's and thick films with Field's stain. Supravital preparations, stained with brilliant cresyl blue (dried alcoholic solution), were made for reticulocyte determination (Whitby and Britton, 1953). Bone marrow was obtained by iliac crest puncture (Rubinstein, 1950), and smears were stained by Leishman and also by May-Grünwald–Giemsa. Differential marrow counts were made using the terminology of Dacie and White (1949) and red-cell maturation curves constructed (Pontoni, 1936). Serum protein estimation was performed by the biuret method, using a photoelectric colorimeter. Results were checked monthly against Kjeldahl. Liver-function tests consisted of thymol turbidity, zinc sulphate turbidity, alkaline phosphatase, and serum bilirubin, all performed with standard techniques. In four patients the serum cholesterol and in two the total serum lipids were estimated. Plasma volume estimation based on the single-injection technique of Chinard (1951) using Evans blue was performed on four patients before and after treatment. Sickling of the red cells was tested for by using a freshly prepared 2% solution of sodium metabisulphite. Cases showing sickling had samples of haemoglobin submitted for paper electrophoresis.

Routine Management

On admission, after blood and bone-marrow samples had been collected, each patient was given 200 mg. of "nivaquine" (150 mg. of chloroquine base) twice daily for three days. The only exception was Case 23, in which 25 mg. of mepacrine was given twice daily for three days. While in hospital all patients were fed by their mothers on food supplied only by them. We withheld comment on their feeding regimes. This course was decided on in order to eliminate alteration in the diet as a factor when assessing the results of treatment. Haemoglobin estimations and reticulocyte counts were done as often as possible. Blood transfusions were administered when it was considered that delay would jeopardize the patient's ultimate recovery. No haematinic was administered to any patient while in hospital, and indeed only one patient received ferrous sulphate, while attending the follow-up clinic. Complications were handled as circumstances warranted. After discharge patients were referred to a special follow-up clinic.

Results

Table I sets out the principal symptoms and signs, haemoglobins on admission, sickling, white-cell counts, and complications encountered.

History.—The average age of the patients was 9½ months (range 4 to 21); only two were over 12 months. There were 16 males and 8 females. The average duration of symptoms was 8½ days (range 1 to 60). All but three patients presented with fever; cough was present in 17 and vomiting in 10.

Diet.—With one exception (Case No. 1) all the patients were breast-fed. (Breast-feeding is almost universal in Ibadan during the first two years of life.) The majority in addition received a carbohydrate supplement in the form of "pap" (maize), "amala" (yam flour), and bread. Six mothers included a small ration of powdered milk in the dietary, and one of these also gave her child orange juice daily.

General Condition on Admission.—Despite severe anaemia 12 cases were in good condition and four fair. The contrast between haemoglobin level and apparent well-being was striking in many of these children. Fig. 1 shows Case 24 soon after admission when his haemoglobin was only 3.8 g./100 ml. It will be seen that he is bright-faced and apparently in robust health. On the other hand, Cases 1, 3, 5, 13, 15, 19, and 23 were very ill on admission and their general condition caused anxiety. There appeared to be no constant relation between haemoglobin level and the degree of illness manifested.

FIG. 1.—Case 24. The haemoglobin was 3.7 g./100 ml. when this photograph was taken.

Nutrition.—The majority were seen to be underweight, some grossly, when compared with standard weight curves for British and American children. The comparison is not valid because of vast social, economic, environmental, and genetic differences in the groups compared. Walters (1956), working in Ilobi, a typical Yoruba village in Western Nigeria, found that the average weight of normal children under 5 years of age was about 20% below that of English

TABLE I.—*Principal Symptoms and Signs, Haemoglobin, Sickling, White-cell Counts, and Complications in 24 Cases of Severe Anaemia in Infants*

Case No.	Age in Months	Sex	Symptoms: Fever	Cough	Vomiting	Diarrhoea	Duration in Days	Weight: lb. oz.	g.	Physical Findings: Gen. Cond.	Heart	Liver	Spleen	Blood: Hb g./100 ml.	Sickling	M.P.	W.B.C.	Complications
1	21	F	–	+	+	+	60	16 0	7,260	V. poor	S.M. E.	Palp.	2f	4·0	Nil	+		Respiratory infection + ascaris. Procaine penicillin
2	7	M	+	–	+	–	8	13 15	6,320	Good	S.M. T.R.	–	+	5·6	,,	+	9,800	Nil
3	9	M	+	+	–	–	5	14 14	6,750	V. poor	S.M.	3f	2f	5·1	,,	+		Respiratory infection. Procaine penicillin
4	7	F	+	–	–	–	2	12 9	5,695	,,	S.M.	3f	+	4·5	,,	+++		Persistent parasitaemia 3 days after nivaquine. Given mepacrine
5	8	M	+	+	–	–	10	15 8	7,030	Fair	N.A.D.	–	+	5·7	,,	+++	17,000	Respiratory infection. Sulphadimidine
6	9	M	+	+	+	–	8	9 2½	4,155	Good	N.A.D.	1f	+	4·9	,,	P.M.	18,200	Nil
7	12	M	+	+	+	+	6	17 7	7,910	Fair	S.M. E. T.R.	2f	+	3·8	,,	–		,,
8	9	F	+	+	+	–	5	12 13	5,810	Good	N.A.D.	1f	–	5·7	,,	–	10,900	,,
9	4	M	+	+	–	–	5	10 4	4,650	,,	N.A.D.	3f	4f	5·7	,,	–	13,600	Gastro-enteritis on 5th day. I.V. fluids + chlortetracycline
10	7	M	+	+	–	–	20	13 4	6,010	,,	N.A.D.	–	3f	5·5	,,	+	11,300	Nil
11	8	M	+	–	–	–	5	9 0	4,080	Poor	N.A.D.			5·5	Trait	–		Diarrhoea on 7th day. S.C. fluid + chlortetracycline
12	11	M	+	+	+	–	7	13 6	6,070	Good	N.A.D.	–	+	4·5	Nil	–	7,600	Nil
13	6	F	+	+	–	–	9	18 0	8,165	Moribund	S.M. E. T.R.	2f	–	4·7	Not done	–	24,300	*Died* soon after admission
14	11	M	+	+	+	+	6	14 8	6,575	Fair	N.A.D.	–	–	4·9	Nil	+G.	11,000	Nil
15	11	M	–	+	–	–	1	10 4	4,650	V. poor	S.M.	3f	4f	3·8	Not done	+		*Died* soon after admission
16	8	M	+	+	–	–	16			Fair	N.A.D.	1f	2f	4·9	Nil	+	10,400	Respiratory infection. Procaine penicillin
17	18	F	+	–	+	+	3	16 2	7,315	Good	N.A.D.	2f	2f	5·3	,,	+++	8,400	Nil
18	12	M	+	+	–	–	5	15 0	6,805	,,	S.M. E.	+	2f	5·9	,,	–	17,000	P.U.O. first 6 days then diarrhoea and dehydration. Sulphadimidine. S.C. fluid. S.C. saline
19	9	F	+	+	+	+	3	13 12	6,235	Dehydr.	N.A.D.	1f	2f	5·3	Trait	P.M. +G.		
20	5	F	+	+	–	–	2			Good	S.M. T.R.			4·8	Nil	+	8,200	Nil
21	8	M	–	+	+	+	5	15 0	6,805	,,	N.A.D.	–	+	5·1	Trait	–	50,200	,,
22	12	M	+	–	–	–	7	15 5	6,945	,,	S.M.	+	2f	5·1	,,	–	4,200	,,
23	6	F	+	–	–	–	7	13 13	6,265	V. poor	S.M.	2f	+	4·8	Nil	+		,,
24	12	M	+	–	–	–	3	22 0	9,980	Good	S.M.	+	1f	3·8	,,	–	16,000	,,

P.M. = pigmented monocytes. S.M. = systolic murmur. E. = enlargement. T.R. = triple rhythm. M.P. = malarial parasites. +G. = gametocytes present. 2f = enlarged 2 fingerbreadths.

children of the same age. Assessing our patients by standards familiar to us from work in the children's department at University College Hospital, Ibadan, most were classified as "within normal limits." Three patients (Cases 1, 6, and 19) showed evidence of mild protein malnutrition.

Cardiovascular System.—Nothing abnormal in the heart could be detected in 12 of our cases. The remainder all had apical systolic murmurs, and, in addition, Cases 1, 7, 13, and 18 showed enlargement of the heart, and in Cases 2, 7, 13, and 20 there was apical gallop rhythm. Case 13 was in congestive cardiac failure on admission. All cardiac signs disappeared on correction of the anaemia.

Abdomen and Chest.—The liver was palpable in 16 cases, and varied in size between 1 and 3 fingerbreadths below the costal margin. The spleen was enlarged in 19 patients, varying from "just palpable" to 4 fingerbreadths below the costal margin. The consistency of the organ was firm and in some patients it appeared to be tender. In spite of the frequent history of cough, only four patients showed evidence of mild respiratory infection. There were no positive tuberculin reactors. Cases 9, 11, and 18 were complicated by non-specific gastro-enteritis that developed in hospital, and were treated with parenteral fluids.

Haematological Findings

As already stated, only those patients with haemoglobin levels of 5.9 g./100 ml. (40%) or lower were included in the investigation. The blood-film appearances are summarized in Table II. It will be seen that in most films the cells were normochromic or slightly hypochromic, and that anisocytosis, poikilocytosis, and polychromasia were frequent findings.

Malarial parasitaemia was found in 13 cases, in all of which the parasite was *Plasmodium falciparum*. The initial reticulocyte count varied from 1% to 28% of total red cells, and in most the count was 5% or more. There appeared to be no relation between reticulocytosis and parasitaemia. The *bone marrow* showed a normoblastic hyper-

TABLE II.—*Red-cell Appearances in Peripheral Blood Film*

Case No.	M.P.	Hypochromic	Normochromic	Anisocytosis	Poikilocytosis	Polychromasia	Nuc. R.B.C. % Total Nuc. Cells	Retics. % Total R.B.C.
1	+	–	+	+	+	+	0	7
2	+	–	+	+	+	+	4	16
3	+	Slight	–	+	+	+	0	<1
4	+ + +	–	+	+	+	+	5	11
5	+ + +	+	–	+	+	+	0	20
6	P.M.	+	–	+	+	+	30	13
7	–	–	+	+	+	–	2	
8	–	+	–	+	+	+	0	9
9	–	+	–			+	6	10
10	+	–	+	+	+	–	0	16
11	–	+	–	+			0	<1
12	–	Slight	–				0	<1
13	–	+	–	+	+	+	2	2·5
14	+G	+	–	+	+	+	0	16
15	+	+	–	+	+		+	10
16	+	–	–	–	–	–	0	<1
17	+ + +	–	+	+	–	+	10	3
18	P.M.	Slight	–	+	+	–	0	10
19	+G	–	+	+	–	+	+	2
20	+	–	+	+	–	+	0	5
21	–	–	+	+	–	+	24	17
22	–	–	+	–	–	–	0	5
23	+	Slight	–	–	–	–	0	28
24	–	+	–				0	30

M.P. = malarial parasites. Nuc. = nucleated. +G = malarial gametocytes.
P.M. + = pigmented monocytes.

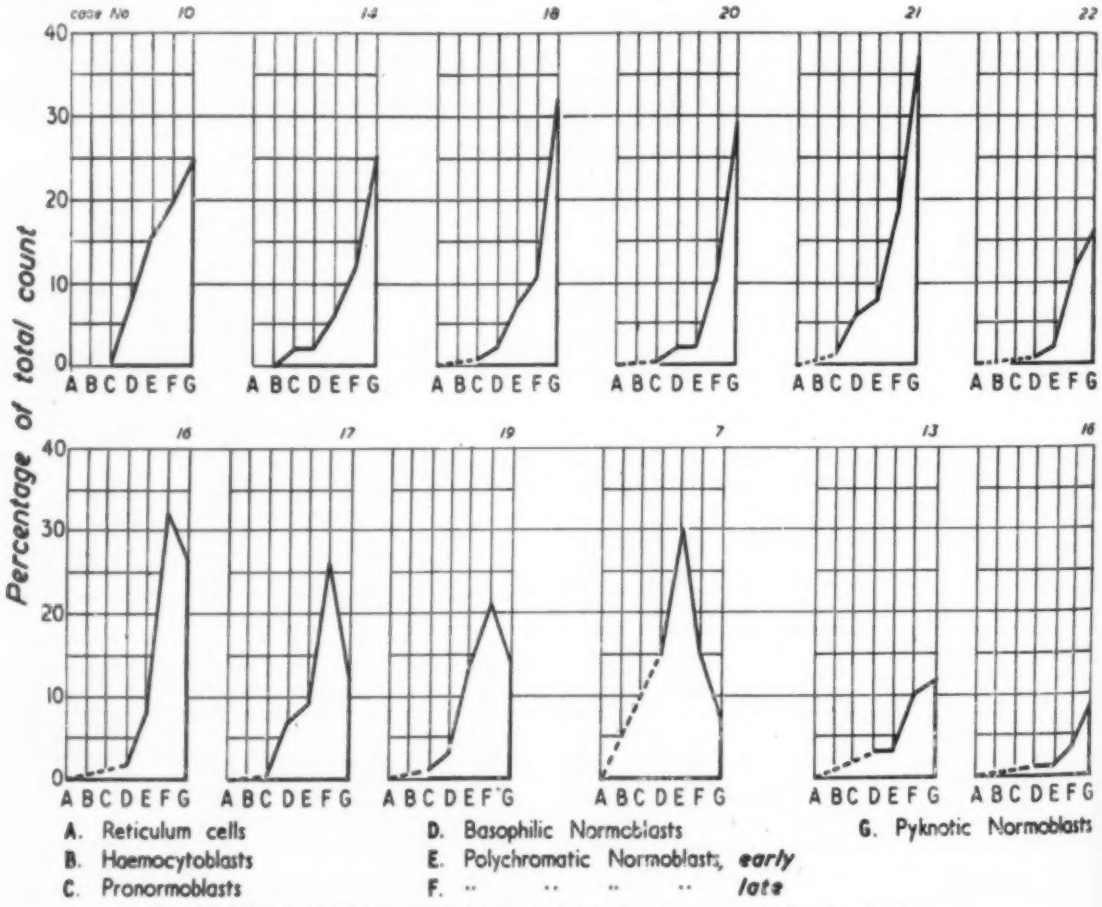

FIG. 2.—Anaemia of infancy presumed to be malarial. Bone-marrow red-cell maturation curves.

plasia in all but one of the patients from whom successful smears were made. Case 6 showed a mildly macronormoblastic marrow. There was evidence of very active erythropoiesis, with a greatly reduced leuco-erythrogenetic ratio (average 0.2:1; range 0.1–0.41:1) in all except Cases 13, 16, and 22, in which the ratio was within normal limits given by Dacie and White (1949)—namely, 0.56–2.67:1.

Bone-marrow maturation curves varied in pattern. Some cases showed a normal pattern with raised peaks, while others showed curves similar to those described for iron-deficiency and congenital haemolytic anaemias. Fig. 2 shows curves that were constructed for 12 cases in the series. Included for comparison are maturation curves after Dacie and White (1949) (Fig. 3).

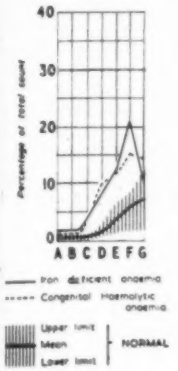

FIG. 3.—Maturation curves (Dacie and White, 1949).

Sickling tests were positive in Cases 11, 19, 21, and 22. Case 11 also had reduced osmotic fragility of the red cells. All four cases were, however, confirmed to be sickle-cell trait and not sickle-cell anaemia on paper electrophoresis of the haemoglobin.

The total *white-cell count* varied considerably, but in 9 of the 16 cases in which counts were done on admission the figure was below 12,000. Two of the remaining cases had counts over 20,000. The differential counts showed a polymorph preponderance in eight cases. Monocytes, many showing pigment granules, were conspicuous in the majority.

Plasma Volume Estimations.—We are indebted to Dr. H. Schneiden, of the department of physiology, for this investigation. Results of estimations done before and after a rise in haemoglobin level in four cases are given in Table III. It will be seen that in Cases 5 and 8 there was a fall in plasma volumes corresponding with a rise in haemoglobin. Case 6 showed no real change. Case 9 had the first test on the day before he contracted gastro-enteritis and became dehydrated. This may in part account for the rise in plasma volume in the second reading.

TABLE III

Case No.	Hb (g. 100 ml.)	Plasma Vol.	Interval	Hb (g. 100 ml.)	Plasma Vol.	Result
5	5·32	384 ml.	10 days	10·3	248 ml.	Fall 136 ml.
6	5·77	426 ,,	10 ,,	8·1	433 ,,	No change
8	5·1	542 ,,	9 ,,	7·4	324 ,,	Fall 218 ml.
9	5·77	242 ,,	9 ,,	9·64	298 ,,	Rise 56 ml.

TABLE IV.—*Serum Proteins, Liver-function Tests, and Serum Cholesterol in Infants with Severe Anaemia*

Case No.	Serum Proteins: Alb. g./100 ml.	Glob. g./100 ml.	Total g./100 ml.	A/G Ratio	Liver-function Tests: T.T. Units	$ZnSO_4$ Units	Bilirubin mg./100 ml.	Cholesterol mg./100 ml.	Total Lipids mg./100 ml.	Alkaline Phosphatase K.A. Units
33	3·6	6·3	9·9	0·57	8		0·8	95	1,000	20·2
4	3·7	6·8	10·5	0·55				107	427	
5	3·0	3·3	6·3	0·91	6		0·8			7·7
6	3·3	2·8	6·1	1·18	3·5		1·9			9·15
7	3·2	3·5	6·7	0·9	9		0·52			23·9
8	2·8	3·3	6·1	0·85	9		0·54			24·0
9	2·8	1·8	4·6	1·5	6		0·51			11·4
10					5		1·0			19·8
12	3·5	3·0	6·5	1·17	4·5					15·3
13					4·0		1·0			17·4
14	3·4	3·1	6·5	1·1	4·5		0·4	55		19·4
16	3·0	2·7	5·7	1·1	9·5		0·4			13·0
17	3·35	3·25	6·7	1·0	12·0	18	0·8	135		
19	3·2	3·9	7·1	0·8	20·6	22·5	0·7			10·5
21					8·4	10·0	0·85			5·9
23*					7·5		0·2			34·5
24*					6·2	7·5	0·2			30·0

T.T. = thymol turbidity. $ZnSO_4$ = zinc sulphate turbidity.
* Liver function tests done after correction of the anaemia.
Comment: The high degree of systemic lipaemia in Cases 3 and 4 probably interfered with accurate globulin determination. In both these patients the serum presented an opaque, creamy appearance.

Serum Proteins.—The average serum albumin level in 12 cases was 3.24 g./100 ml. (range 2.8 to 3.7) and globulin 3.62 g./100 ml. (range 1.8 to 6.8), giving an A/G ratio of 0.89 to 1. Cases 3 and 4 showed abnormally high globulin levels which were thought to be false values occasioned by a high degree of systemic lipaemia which was present in these cases and interfered with accurate globulin determination. Excluding Cases 3 and 4, the average serum globulin becomes 3.97 g./100 ml. and the A/G ratio 1.05 (see Table IV). In order to provide a comparison, we examined the blood of some healthy non-anaemic children seen at an infant welfare clinic. Results are shown in Table V. The average serum albumin was 3.05 g./100 ml. (range 1.5 to 3.8) and average globulin 2.9 g./100 ml. (range 1.8 to 4.2), giving an A/G ratio of 1.05 to 1. Edozien (1957) records the average results of serum protein determinations on 200 healthy adult Nigerians as follows:

Total protein	..	6.8±0.4 g./100 ml. (5.8 to 7.5)
Albumin	..	3.6±0.3 g./100 ml. (2.6 to 4.0)
Globulin	..	3.2±0.4 g./100 ml. (2.5 to 4.0)
A/G ratio	..	1.12 (0.8 to 1.5)

It will be seen that all the patients with anaemia and all but one of the welfare clinic cases (WC/324) had serum proteins within normal limits for Nigerians.

TABLE V.—*Results of Serum Protein Estimation, Liver-function Tests, and Serum Cholesterol Estimation in Healthy Infants at an Infant Welfare Clinic, University College Hospital, Ibadan*

Case	Age in Months	Serum Proteins: Alb. g./100 ml.	Glob. g./100 ml.	Total g./100 ml.	A.G. Ratio	Liver-Function Tests: T.T. Units	$ZnSO_4$ Units	Bilirubin mg./100 ml.	Cholesterol mg./100 ml.	Alk. Phos. K.A. Units
WC/128	4	3·0	2·6	5·6	1·1	6·0	2·6	0·15	80	15·5
WC/191	10	3·2	2·0	5·2	1·6	4·9	4·0	0·5		32·6
WC/362	4	3·4	1·8	5·2	1·8	2·8	1·8			70·28
WC/28	15	3·0	3·1	6·1	0·96	6·5	2·8		124	75·9
WC/319	5	2·6	3·4	6·0	0·76	8·0	3·2	0·3		98·6
WC/324	3	1·5	4·2	5·7	0·35	2·2	2·4	0·15		14·2
WC/136	15					7·0	8·0	0·32	90	35·9
WC/380	1					0·6	4·5			
WC/378	1					0·6	4·2	0·4		
WC/318	9	3·4	2·8	6·2	1·2				70	
WC/—	2	3·6	3·0	6·6	1·12				118	
WC/—	12	3·8	3·2	7·0	1·18				128	

Comment.—The children selected for the above investigations were all well nourished and showed no clinical evidence of anaemia. Physical examination revealed no abnormality. Blood films of Cases WC/28, 319, and 324 were negative for malarial parasites. The remaining cases did not have blood films taken at the time the tests were performed. (The clinical assessment of these children was made by a senior paediatric consultant.)

Liver-function Tests

Thymol turbidity tests performed on 16 patients gave high readings (Table IV). The average value was 7.7 units (range 3.5 to 20.6). The zinc sulphate turbidity test performed on four patients gave an average reading of 14.5 units (range 7.5 to 22.5). Similar tests performed on the welfare clinic cases gave the following results (Table V): thymol turbidity, average, 4.3 units (range 0.6 to 8); zinc sulphate turbidity, average, 3.7 units (range 1.8 to 8). It will be seen that, while there was close agreement in the results of serum protein estimation in the two groups compared, the results of the flocculation tests differ. The zinc sulphate turbidity depends almost entirely on the gamma-globulin fraction of the serum, and is a relatively accurate index of the concentration of the gamma-globulin (Kunkel, 1947, and Discombe *et al.*, 1954, quoted by Edozien, 1957). It would therefore appear that there was a qualitative difference in the globulin fraction in the two groups, caused by an increase in the gamma-globulin in the anaemic children.

Estimation of the *serum bilirubin* in 15 anaemic patients gave an average value of 0.7 mg./100 ml. (range 0.2 to 1.9). Only three patients had values above the accepted upper limit of normal. Results on six welfare clinic cases gave

an average of 0.3 mg./100 ml. (range 0.15 to 0.5). Serum alkaline phosphatase levels tended to be high in both the anaemic and the non-anaemic children seen in the welfare clinic. Three children in the latter group gave readings of 70.28, 75.9, and 98.6 K.A. units respectively. The explanation might be that these children had rickets, a not uncommon finding in Ibadan, but the possibility of a laboratory error cannot be overlooked. (These three tests were done on the same day).

Response to Treatment

There were two deaths in the series; both occurred within the first few hours after admission. Case 13 was desperately ill on admission and thought to be in cardiac failure. She was given 50 ml. of packed cells and appeared to stand the transfusion well. Three hours later she was given an intramuscular injection of 200 mg. of nivaquine, and died shortly after. Case 15 was admitted with a haemoglobin level of 3.7 g./100 ml. and was in very poor general condition but showed no evidence of cardiac failure. He was transfused slowly and given 80 mg. of nivaquine by intramuscular injection but died shortly after. In neither case were we able to obtain a necropsy, nor was the exact cause of death determined, but in both we suspected that the injection of nivaquine might have been causally related. They were, however, both very anaemic and very ill and the risks of transfusion in such cases are considerable. Despite the very large oral doses of nivaquine used in this series and in many other patients, we have not observed any toxic effects when the drug is given by this route, but we have been alarmed on several occasions at sudden collapse occurring within minutes of an injection of nivaquine in anaemic infants not otherwise ill.

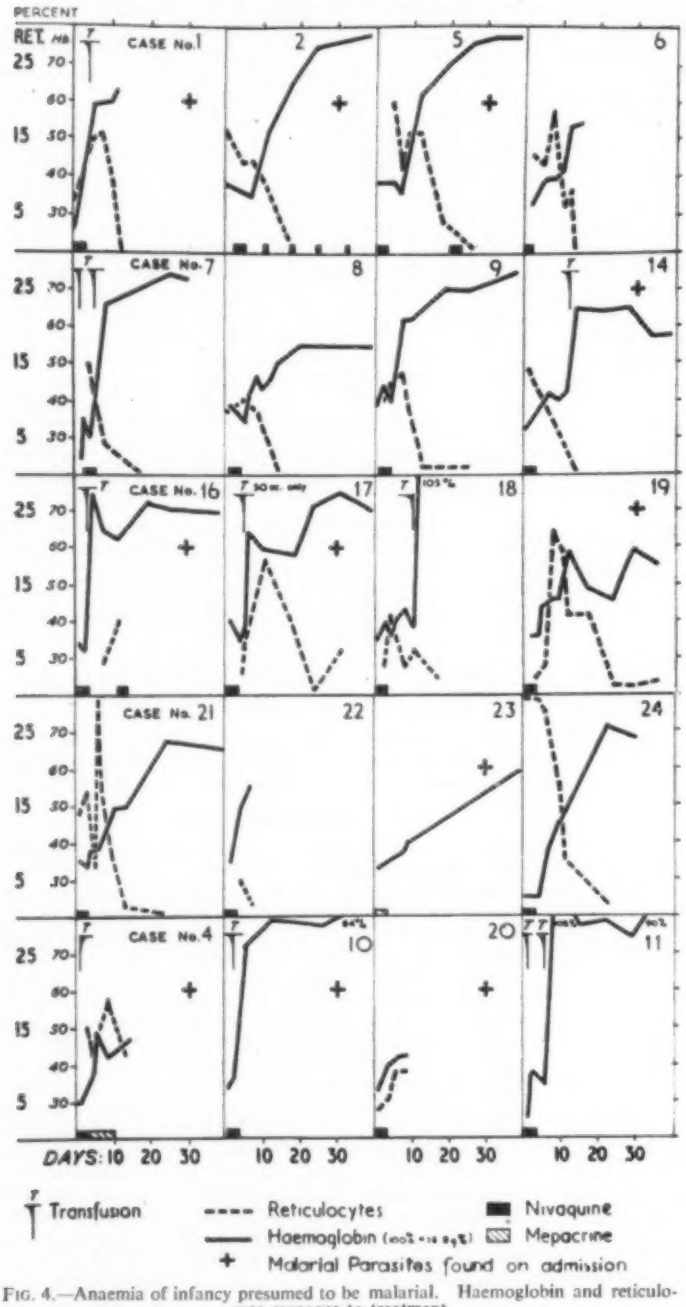

FIG. 4.—Anaemia of infancy presumed to be malarial. Haemoglobin and reticulocyte response to treatment.

Fig. 4 shows the response of haemoglobin and reticulocytes to treatment over 40 days in 20 cases. (Cases 3 and 12 are shown separately on Fig. 5.) It will be seen that in all the untransfused patients the haemoglobin rose steeply after a lag period of up to seven days. In some patients there was a slight initial fall in haemoglobin. In Cases 2, 5, 6, 9, 21, and 24 the rise in the haemoglobin was sustained at the rate of 0.3 to 0.4 g./100 ml. (2–3%) for 14 to 21 days, reaching levels of 10.36 g. (70%) after about 21 days. Cases 20 and 22 appear to have responded in a similar manner, but the records are short. Case 8 responded similarly, but the level did not rise above 8.14 g. (55%). The haemoglobin level in Case 19 pursued a more erratic course, rising to 8.6 g. (58%) by the 29th day and remaining at this level for six weeks, after which it rose to 10.66 g. (72%) without further treatment. Case 23 showed a slower but steady rate of increase of haemoglobin from 4.9 g. (33%) on the first day to 11.8 g. (80%) by the 75th day.

In most of the transfused patients the post-transfusion level of haemoglobin was maintained or it continued to rise. Cases 7, 10, and 17 show this well. Case 14 showed a fall from 9.6 g. (65%) after transfusion to 8.6 g. (58%) on the 40th day, but by the 56th day the haemoglobin had risen to 11.24 g. (76%).

Fig. 5 shows the result of a 200-day follow-up in Cases 3 and 12. Case 3 had frequent relapses (or reinfections) of malignant tertian malaria in spite of prolonged use of nivaquine and pyrimethamine (daraprim) orally. On two occasions after nivaquine had been given intramuscularly, blood films became negative, reticulocytes rose and then fell, and the haemoglobin rose. Possibly his mother had failed to give him his oral doses, but she seemed reliable, and attended regularly, and insisted that she had carried out our instructions. Notwithstanding the persistent parasitaemia and fluctuations in haemoglobin level, his weight showed a slow but steady rise except between the 60th and 70th days, when there was a fall associated with an attack of diarrhoea.

In Case 12 the haemoglobin level fell steadily after transfusion, when it was over

15 g., to 6.35 g. (43%) by the 102nd day. This fall was accompanied by return of malarial parasites in the peripheral blood film. Nivaquine was then given and the haemoglobin again rose to 12.72 g. (86%) by the 137th day. His weight showed a steady increase throughout. When parasites reappeared on the 150th day there was another fall in haemoglobin and weight. No treatment was given. The haemoglobin level became stationary at 10.95 g. (74%) and the weight at 18 lb. (8,165 g.), and both remained thus until the 218th day (not shown in Fig. 5). On the 250th day he had fever and was coughing, and the haemoglobin was found to be 8 g. (54%). Nivaquine was prescribed. On the 280th day, when he was last seen, his haemoglobin level was 10.36 g. (70%) and his weight 20 lb. 8 oz. (9,300 g.).

Reticulocyte response to nivaquine seemed to be of two types. The first, shown by Cases 1, 3, 4, 6, 9, 16, 17, 18, 19, 20, and 21, is typified by a peak about seven days after start of treatment, and conforms to Fairley's (1934) description of a reticulocyte crisis following administration of quinine in malaria. The second type, seen in Cases 2, 5, 7, 8, 14, and 23, consists of a high initial count falling steadily after the start of treatment.

Discussion

Ibadan is in a highly malarious area, and any investigation into the aetiology of anaemia, in any age group, occurring locally must perforce be influenced by this consideration. At the outset of the present investigation we could only guess at the contribution of malaria to the anaemia of infants. We aimed first to eliminate malaria as a variable by giving all our patients a large enough dose of nivaquine to be certain of controlling any latent or overt infection, and decided to use the drug irrespective of the presence or absence of parasitaemia. Besides malaria, the population of Ibadan, because of a deficiency of protein in their diet, suffer from protein malnutrition (Lawson and Lister, 1956).

Woodruff (1955), reporting on work carried out in Ibadan, states: "There is, therefore, evidence that anaemia in some African older children, adult males, and non-pregnant females may be associated with chronic protein malnutrition and liver damage, and this anaemia has the same characteristics as that found in young children and pregnant females." With this in mind, we paid particular attention to the dietary histories of our patients, and in order to avoid confusion we decided to keep them on their accustomed diets until the results of investigation showed the need for a change. The results set out above show that we were able to correct the anaemia in all our patients, without altering the diet, by giving them nivaquine, supplemented where necessary by blood transfusion. Of particular interest is the fact that improvement occurred irrespective of the initial presence or absence of malarial parasitaemia. Trowell (1949, 1956), working in Uganda, found

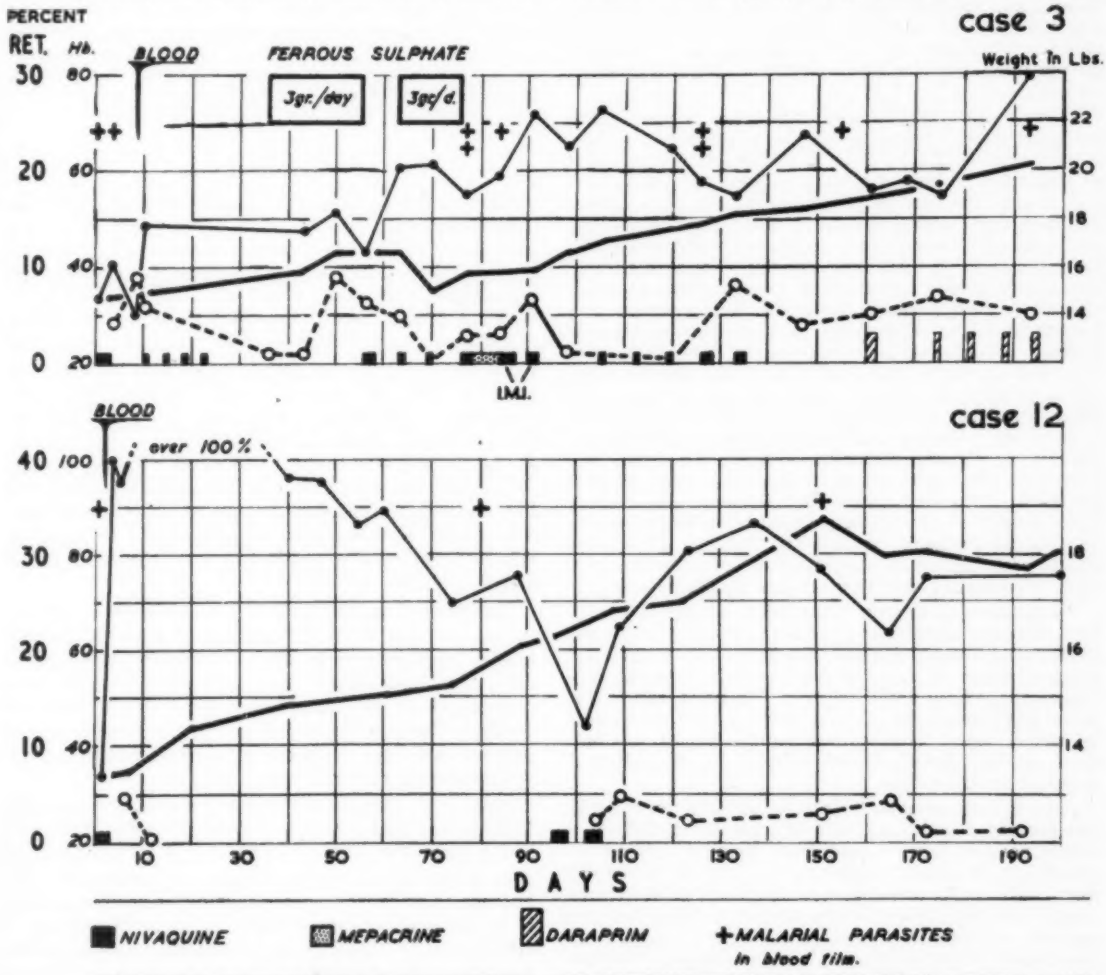

FIG. 5.—Anaemia of infancy presumed to be malarial. Haemoglobin, reticulocytes, and weight. (200-day follow-up.)

that in infancy severe anaemia is usually caused by malaria. He records that following quinine administration combined with a high-protein diet these infants show a reticulocyte response and rapid rise in haemoglobin level.

Iron deficiency is an important cause of anaemia in infancy. Milk-fed infants rely to a great extent on stores laid down in the liver in foetal life, and these in turn depend to some degree on the mother's diet during pregnancy. Premature infants are born with limited iron stores and are prone to hypochromic anaemia. Infections serve to increase iron requirements; infants reared in unhygienic surroundings are thus particularly subject to hypochromic anaemia (Holt and McIntosh, 1953). In Ibadan, maternal diets are generally poor, environmental conditions are unhygienic, and the incidence of prematurity is high (Lawson and Lister, 1956; Woodruff, 1951). It is surprising, therefore, that iron deficiency appeared to play no significant part in the pathogenesis of anaemia in our patients, who, without exception, recovered without being given iron. Clinical evidence and response to antimalarial treatment has led us to conclude that we were dealing with anaemia resulting from infection with *Pl. falciparum*. The efficacy of chloroquine in the treatment of malaria is well established (Trowell, 1956). However, the possibility exists that the drug might have acted in some other manner. Dähne (1943) found that quinine and mepacrine produced a reticulocyte response within three to eight days in normal non-anaemic and non-malarious subjects. He attributed this to a direct action on the bone marrow. In the absence of evidence to the contrary we must recognize the possibility that chloroquine might have acted in a similar manner in our patients.

Bruce-Chwatt (1952), working in Southern Nigeria, found the mean parasite rate in a sample of 138 infants to be: 0 to 3 months, 2.2%; 3 to 6 months, 60.0%; 6 to 9 months, 60–70%; over 9 months, ± 80%. It will be seen that prior to the third month of life the rate is negligible, but from then onward there is a sharp increase, so that by the age of 12 months 80% of infants have been infected. Reference to Table I will show that this "age of infection" corresponds in our patients with the age group in which anaemia is most common, but, whereas the parasite rate remains high after the first year, the incidence of anaemia declines. This decline in the incidence of anaemia is probably more apparent than real. After the first year the incidence of protein malnutrition rises and patients with anaemia and obvious malnutrition were excluded from the investigation. The explanation may, however, be bound up with immunological responses. During the first three months of life infants appear to be able to resist malarial infection. Thereafter susceptibility increases and anaemia might develop as part of the reaction of an individual with no acquired premunity to malaria. Survival of repeated attacks probably results in increased premunity, with consequent reduction in severity of clinical manifestations.

The anaemia of malaria is generally ascribed to haemolysis, though capillary haemorrhage may play a part (Strong, 1945). The essential features of a haemolytic anaemia are persistent anaemia, persistent reticulocytosis, hyperbilirubinaemia, and excess urobilinogen in the urine and in the faeces (Davidson, 1954). Our patients showed no evidence of haemorrhage. Jaundice was entirely lacking, and only three patients showed serum bilirubin levels slightly in excess of normal values.

In haemolytic anaemia the plasma bilirubin level usually lies between 1 and 3 mg./100 ml., but occasionally it is within normal range, normal levels being maintained by the ability of a healthy liver to excrete far more bilirubin than it is normally called upon to do (Dacie, 1954). Hepatomegaly and high values for the thymol turbidity and zinc sulphate turbidity tests in most of our cases suggest derangement of liver function. It seems unlikely, therefore, that normal serum bilirubin levels were maintained by healthy livers doing *more* than is usually required. In those patients in whom urine analyses were performed there was no excess urobilinogen. From our findings it seems improbable that haemolysis was the only factor in the pathogenesis of the anaemia. All our patients showed active erythropoiesis, and it is difficult to reconcile this with the anaemia, seeing that there was no convincing evidence of blood loss by haemorrhage or haemolysis. Woodruff (1951) found a similar discrepancy between the bone-marrow appearances and the peripheral blood in his cases of anaemia of pregnancy in Ibadan; and Altman and Murray (1948, quoted by Woodruff, 1951) made a similar observation in nutritional anaemia of infants.

One is reminded of thrombocytopenic purpura, in which, in spite of a hyperplastic marrow with an increase in megakaryocytes, there is a reduction in the number of platelets in the peripheral blood. Splenectomy often produces dramatic relief in these patients. Wiseman and Doan (1939) described primary splenic neutropenia in which there is agranulocytosis due to excessive phagocytosis of neutrophils in the spleen. The bone marrow in these cases shows a myeloid hyperplasia. Doan (1944, quoted by Nelson, 1945) suggests that "the spleen has an inherent capacity for unusual sequestration and destruction of the formed elements of the blood, and that this function may be stimulated to excessive activity by any condition which causes the spleen to enlarge. In such instances anaemia, leucopenia, and thrombopenia may result because the bone marrow in spite of hypertrophy is unable to compensate." It might be that disturbance of this function is operative in producing the peculiar blood picture which we have described. Results of plasma-volume estimation in our cases suggest that alteration in plasma volume may also be a factor in the pathogenesis of the anaemia.

Summary

Severe anaemia in infancy is often seen at University College Hospital, Ibadan. The results of investigation of 24 cases of severe anaemia in infancy are presented. The typical clinical picture was: a breast-fed baby about 9 months old presenting with fever, cough, and, in 50%, vomiting of one week's duration. Examination showed hepatosplenomegaly, and, in 50%, cardiac signs. The blood showed a normochromic or slightly hypochromic anaemia with anisocytosis, poikilocytosis, and polychromasia. The reticulocyte count was raised and the bone-marrow showed a normoblastic hyperplasia. *Pl. falciparum* was found in 13 cases. Serum proteins fell within the normal range for adult Nigerians, and liver-function flocculation tests gave high values in most. The serum bilirubin was raised in only three cases. After correction of anaemia two cases showed a fall in plasma volume.

Treatment consisted only in giving nivaquine (chloroquine) in large doses irrespective of malarial parasitaemia, supplemented by blood transfusion when necessary. No haematinics were given, and patients were maintained on their accustomed diet. There were two deaths. The rest responded to treatment, untransfused patients showing a rapid rise in haemoglobin to normal. A reticulocyte response was noted.

Malaria is thought to be the cause of the anaemia. Malnutrition and iron deficiency play no significant part in the aetiology. The possibility that nivaquine might exert a specific haematinic influence is considered. The absence of evidence of gross haemolysis or haemorrhage in an anaemic patient showing active erythropoiesis is commented on, and it is suggested that abnormal splenic function ("hypersplenism") and alterations in plasma volume may be factors in the pathogenesis of the anaemia.

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PROLONGED ANURIA COMPLICATED BY EPILEPTIFORM FITS

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The dietary and fluid restrictions imposed on patients with anuria has been fully described (Bull *et al.*, 1949; Merrill, 1955). The occurrence of severe convulsions late in the course of treatment is not a generally recognized complication.

The patient whose case is described below had very severe epileptiform fits on her 17th day of anuria, and recovered. The management and aetiology of the fits, as well as the nature of the residual renal lesion and its effect on child-bearing, are discussed.

Case History

A primigravida aged 26 was first seen on March 25, 1955, at the 25th week of pregnancy. Her blood pressure was 130/80 mm. Hg; there was no proteinuria or past history of renal disease. During the 29th week of gestation she was admitted to hospital complaining of abdominal pain, vomiting, absence of foetal movement, and anuria for some hours. She was pale and anxious, and her blood pressure was 140/90. There had been no vaginal bleeding. A small quantity of urine was obtained from the bladder by catheter, and there was no proteinuria.

On examination the uterus was hard and tender, and foetal parts could not be palpated nor the foetal heart heard.

Two pints (1,100 ml.) of blood was given, and three hours after admission uterine contractions were felt, so the forewaters were ruptured. Eight hours later a stillborn foetus was expelled, with 5 pints (2,840 ml.) of blood clot and the placenta. A further 2 pints (1,100 ml.) of blood was transfused. No fall in blood pressure had occurred since she was admitted to hospital.

After delivery no further obstetrical complication arose, but complete anuria persisted for the first 11 days, and oliguria for another six (see Table and Chart). The anuria

Fluid Intake and Output

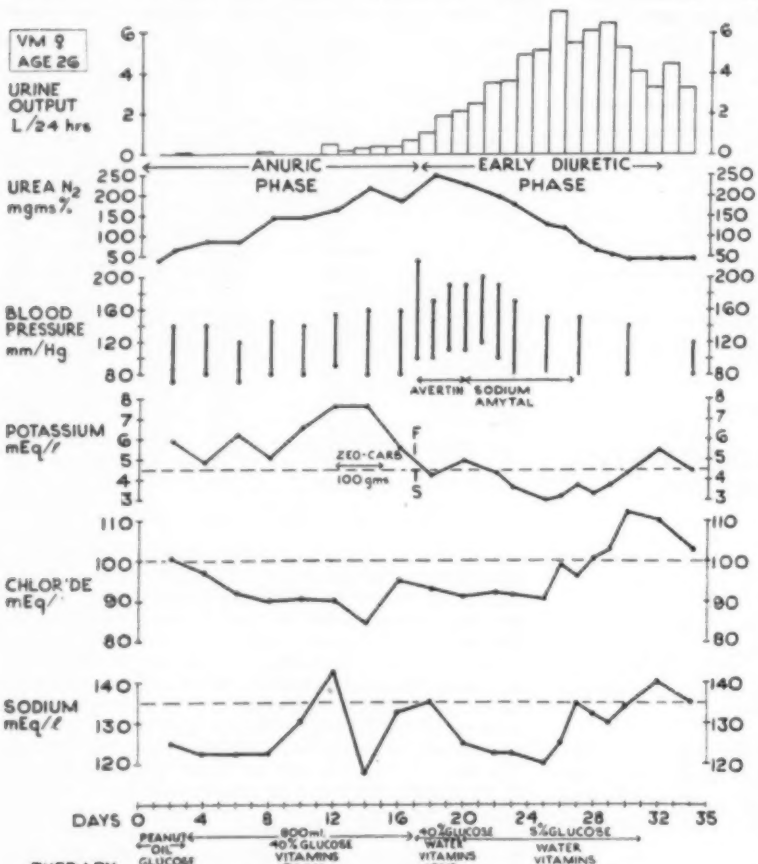
Day	Input (ml.)				Output (ml.)		
	Mouth	Intragastric Drip	Intravenous Drip	Total	Urine	Vomit	Total
1	780	—	1,000 (blood)	1,780	—	—	—
2	120	600	1,000 (blood)	1,720	1	—	1
3	—	1,000	—	1,000	28	—	578*
4	—	800	—	800	—	—	—
5	800	—	—	800	10	150	160
6	800	—	1,000 (blood)	1,800	—	—	—
7	800	—	—	800	—	30	—
8	840	—	—	840	100	803	903
9	—	800	—	800	—	510	510
10	—	500		500	—	350	350
11	—	400	500 (blood)	900	—	240	240
12	—	500	—	500	510	360	870
13	495	—	700	1,195	150	105	255
14	480	—	1,000	1,480	270	—	270
15	180	—	1,025	1,605†	330	—	330
16	—	—	1,000	1,600‡	360	30	390
17	—	—	1,940	1,940	690	—	690
18	—	—	1,600	1,600	1,080	—	1,080
19	—	—	2,300	2,300	1,875	135	2,010
20	—	—	3,000	3,000	2,130	150	2,280
21	—	—	3,000	3,000	2,475	30	2,505
22	—	—	3,500	3,500	3,540	255	3,795
23	30	—	4,500	4,530	3,600	30	3,630
24	210	—	4,500	4,710	4,860	150	5,010
25	600	—	6,000	6,600	5,100	30	5,130
26	450	—	6,000	6,450	6,960	—	6,960
27	1,040	—	5,000	6,040	5,490	90	5,580
28	2,500	—	4,000	6,500	6,120	—	6,120
29	2,625	—	4,000	6,625	6,480	—	6,480
30	4,130	—	2,500	6,630	5,295	—	5,295
31	4,230	—	900	5,130	4,065	—	4,065

* 550 ml. in faeces. † 400 ml. by enema. ‡ 600 ml. by enema.

was treated on conventional lines at first, with 400 g. of glucose, 100 g. of peanut oil, emulsified to 1 litre of water (Bull *et al.*, 1949). As the anuria persisted the quantity of fluid was reduced to 800 ml. a day, given by mouth as 50% glucose with adequate vitamins. Excessive vomiting occurred on the eighth day, and the fluid was then given by intragastric drip: further attacks of vomiting necessitated changing to 40% glucose, given by caval drip (de Keyser *et al.*, 1949; Bull, 1952; Russell *et al.*, 1954). The electrolyte balance of the patient was followed at frequent intervals, and on the 12th day the serum potassium had risen to 7.6 mEq/l. This was reduced to 4.2 mEq/l. by giving 100 g. of "zeo-carb. 225/Na," suspended in 1 litre of water, administered in five divided doses over two days. The anaemia was twice treated by transfusion of concentrated red blood cells, 2 pints (1,100 ml.) on the sixth day and 1 pint (550 ml.) on the eleventh day.

Epileptiform Fits.—On the 17th day, just as renal function was returning, a series of epileptiform fits occurred, and at the first fit a blood pressure of 220/90 was recorded (a blood pressure of 170/100 had been recorded earlier in the day, a slight rise over the 160/80 of the day before) (see Chart). These fits were not controlled by the prompt administration of 4½ gr. (0.3 g.) of phenobarbitone sodium intramuscularly, nor by 3 g. of NaCl intravenously. The fits started to come at ever-increasing frequency and violence, 10 occurring in about two and a half hours. Thiopentone sodium, 0.5 g. intravenously, brought immediate respite, and a further 0.25 g. was given when muscular twitching became apparent 15 minutes later. Bromethol ("avertin"), 6 ml. in 8 oz. (230 ml.) of water, was given, and this was followed by a fall in the blood pressure to 140/90. A further 4 ml. of bromethol was given three hours later, when the blood pressure had risen to 195/110. The blood pressure then fell to 165/90, and did not rise again, nor did fits recur. Sodium amylobarbitone, 3 gr. (0.2 g.), was given intravenously for the next six nights, which kept her in a very drowsy state. She was discharged from hospital on the 43rd day after the onset of the concealed accidental haemorrhage.

Fluid and Electrolyte Balance During Recovery Period.—The urine output returned in ever-increasing quantities following the occurrence of the epileptiform fits. During the period of semi-coma the fluid balance had to be maintained with intravenous therapy, and this was reinforced by the addition of sodium, potassium, chloride and bicarbonate. On the 23rd day, when the patient had regained consciousness, she was still nauseated, and the fluid requirement had to be maintained intravenously. This nausea



decreased and more fluid could be given by mouth, but not until the 31st day of her illness was it possible to stop the intravenous supplement, the caval drip having operated for 19 days. Thereafter the patient returned to a full diet, taking all fluid and medication orally. On the 41st day—that is, two days before her discharge—the output of urine was 1,500 ml.

Subsequent Course.—One year after leaving hospital the patient was reinvestigated. Protein was still present in the urine in considerable quantity, as were a few pus cells and an occasional red blood cell. No casts were found. An intravenous pyelogram showed no abnormality other than a slight distortion of the calices of the left kidney. The plasma levels of sodium, potassium, chloride, calcium, phosphorus, and protein, and the carbon dioxide combining power were within normal limits, but the blood urea was 66 mg./100 ml. The haematocrit reading was 47%. The inulin clearance was 49 ml. a minute, and the P.A.H. clearance 224 ml. a minute. It was apparent, therefore, that considerable impairment of renal function existed. The nature of the residual lesion was obscure, particularly as no values were available prior to the onset of the accidental haemorrhage, although there is no reason to suspect pre-existing renal damage on the findings at her first antenatal visit.

Management of the Anuria

No new principles were involved here. The original recipe of glucose, peanut oil, and water (Bull *et al.*, 1949) is no longer advocated (Bull *et al.*, 1955; Parsons and McCracken, 1957). In particular, the peanut oil has been found unnecessary because, in the first place, the average reserves of fat in a patient developing acute anuria are sufficient to tide the individual through the anuric phase (Merrill, 1955), and, secondly, because of the incidence of nausea and the occasional occurrence of fat pneumonia. The amount of glucose to be administered should be pushed to the maximum dose of toleration for the purpose of reducing endogenous protein breakdown. A glucose-water mixture, adequately supplemented by vitamins, can often be taken by mouth without having to resort to an intragastric drip, but in this patient nausea occurred early, and the intragastric drip had to be used after the eighth day. Then, because of incessant vomiting, 40% glucose was delivered into the inferior vena cava by a "polythene" catheter from the 13th day onwards. Intravenous therapy had to be maintained in this patient even after the anuric phase had given place to the recovery phase, as vomiting and nausea prevented adequate oral intake to keep pace with the urinary output.

The quantity of fluid required during the anuric phase could not be ascertained with certainty in this patient, as no weighing scales were available. The total fluid balance for the first 16 days' treatment is given in the Table: input exceeded output by 8.7 litres, an average of 550 ml. per 24 hours, which probably is the amount of fluid required to satisfy the insensible loss when the water of oxidation and the water released in the cells when protein is mobilized are taken into consideration. These calculations would suggest that perhaps no overhydration had taken place in the course of treatment. It is, however, emphasized that the fluid-balance chart can be notoriously inaccurate in these situations, and the only satisfactory investigation that can be performed to guard against overhydration is to weigh the patient daily (Merrill, 1955).

The degree of metabolic breakdown that was occurring during the period of anuria was not high in this patient, for the average daily rise in the blood urea nitrogen during the period of anuria was only 11.4 mg./100 ml.

The dangerous rise in the serum potassium level that occurred on the 12th day was treated by giving ion-exchange resin zeo carb 225/Na. As this could not be administered orally it was given by slow rectal drip, the resin being suspended in water. It will be seen from the Chart that this dose of resin successfully reduced the serum potassium level from 7.6 to 4.2 mEq/l.

Epileptiform Fits

The aetiology of the fits can only be a matter for conjecture. It seems unreasonable to postulate the occurrence

of eclampsia as long as 17 days after delivery, unless the renal failure had delayed the excretion of a substance responsible for eclamptic fits. These were associated with a marked rise in the blood pressure, and, although the treatment used in this patient caused a marked drop in the blood pressure with the cessation of the fits, it is no explanation simply to attribute the fits to the raised blood pressure, for this only leaves unsolved the aetiology of the sudden hypertension.

It is well known that overhydration with water can cause convulsions of an epileptiform type, but the fluid-balance investigations did not indicate an excessive intake of water, and certainly no clinical evidence of overhydration occurred. These findings were supported by the fact that rapid intravenous injection of 3 g. of sodium chloride failed to control the fits. Indeed, prior to the onset of the fits sodium had already been administered in the form of the ion-exchange resin.

From the evidence available it can only be assumed that the fits were associated in some way with the anuria and progressive uraemia, for after restoration of renal function the fits ceased and did not recur.

The *treatment* of the convulsions was entirely empirical, and was based on the management of eclampsia. Thiopentone was used as an emergency, followed by a full dose of bromethol. This was effective in controlling the fits initially, and a further small dose of bromethol was given three hours later, when the blood pressure began to rise again. Fortunately no harm came from the use of these drugs despite poor renal function.

Nature of the Residual Renal Lesion

The presence of proteinuria even one year after the episode of anuria suggests that the renal lesion was of some magnitude, and this is supported by the lowered inulin and P.A.H. clearances. The presence of pus cells also requires further explanation. No organisms were found in the urine either during the period of anuria or subsequently. Cystoscopy revealed no abnormality, and a retrograde pyelogram was essentially normal in the follow-up period. Perhaps the pus cells are the result of gross renal damage undergoing repair.

Future Pregnancies

In the chronic phase of Ellis type I nephritis the chances of foetal survival are very poor, and deterioration of the maternal condition is very great when the blood urea level is raised above 40 mg./100 ml. at the beginning of pregnancy (Dodds and Browne, 1940; Hamilton, 1952). In chronic pyelonephritis of comparable severity, on the other hand, the prognosis for the infant would not be so poor, and the maternal risk would lie more in the danger of superadded acute renal infection. In any case, the possibility of a recurrent pre-eclampsia and even accidental haemorrhage has to be considered. It would seem, therefore, that there would be considerable risk to mother and foetus in a further pregnancy. If the husband and wife are still determined to try again we could only keep a close watch, and offer termination of pregnancy immediately signs of deterioration develop.

Summary

A case is described of anuria for 11 days and oliguria for a further six days following severe concealed accidental haemorrhage.

Epileptiform fits occurred on the 17th day of reduced renal output. They were associated with a sudden rise of blood pressure.

The detailed management of the anuria and of the fits is described.

The results of renal investigations one year later are given. They showed persistent proteinuria and pyuria, with considerable impairment of renal function.

The management of anuria, the possible aetiology of the fits, the nature of the residual renal lesion, and the prognosis for future child-bearing are discussed.

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CORTICOTROPHIN IN TREATMENT OF HYPERTHYROIDISM

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Harris and Woods (1956) reported that electrical stimulation of the tuber cinereum of rabbits by remote control rarely produced the expected increase in thyroid activity unless preceded by adrenalectomy. After reviewing other evidence for the possible inhibitory action of the adrenal cortex on thyroid function, they concluded that further investigation of the effects of corticotrophin administration in early and previously untreated cases of Graves's disease would be of interest. This communication records such an investigation, a preliminary report of which was given by Richardson (1957).

Methods

Eight patients with hyperthyroidism were admitted to hospital. The clinical diagnosis was confirmed by observation for at least 10 days, during which time radioiodine studies and protein-bound iodine estimations were made. Basal metabolic rate (B.M.R.) estimations were also carried out on three days towards the end of the observation period. Corticotrophin gel was then given by intramuscular injection for from two to five weeks, the initial dose of 20 units b.d. being halved in some cases after 7 to 11 days. At the end of the period of treatment the laboratory studies of thyroid function were repeated (Table I). The potency of the batch of corticotrophin which was used throughout had previously been demonstrated on a healthy subject. Confirmation of the efficiency of the adrenocortical stimulation was provided by the fluid retention which occurred and by the increases which were detected in the urinary excretions of 17-ketosteroids and 17-ketogenic steroids. Excessive retention of fluid was combated in the thyrotoxic subjects by injections of mersalyl, but such injections were not given when radioiodine or urinary steroid excretion studies were being made. However, in spite of precautions, pulmonary congestion developed at the end of the course of treatment in two patients.

A ninth patient with hyperthyroidism was treated with prednisone, 20 mg. b.d., for 14 days and studied in a similar way.

Results

A significant improvement in the hyperthyroid state was observed in only one patient, a man aged 40 with mild hyperthyroidism, a diffuse goitre, and symptoms of short duration (Case 2). Even though the improvement was only

TABLE I.—*Clinical Details of Nine Hyperthyroid Patients, with Results of Laboratory Tests of Thyroid Function Before and at End of Treatment*

Case No.	Age in Years	Sex	Goitre	Duration of Symptoms (Months)	B.M.R.* %		Serum P.B.I. µg. 100 ml.		Radioiodine Studies (% of Administered Dose)									
									Urine Excretion				Thyroid Uptake at 24 Hours		Plasma Radioiodide per Litre		Plasma P.B. Radioiodine per Litre	
									0–8 Hours		8–24 Hours							
					C	T	C	T	C	T	C	T	C	T	C	T	C	T
1	55	F	N	18	+37	+58	7·5	6·8	7·8	7·5	0·6	3·1	77·5	73·5	0·8	—	0·68	—
2	40	M	D	4	+27	+6	11·6	8·6	9·7	23·3	1·3	3·2	52	31·3	0·73	0·59	0·71	0·58
3	45	F	D	9	+44	+33	9·5	10·3	—	5·7	0·6	0·6	73·5	84	1·04	1·05	0·95	—
4	43	F	D	6	+51	+50	21·2	16·4	—	3·4	0·9	0·4	76	78	0·81	—	0·79	—
5	57	F	N	6	+40	+41	9·4	12·2	6	9·7	2·6	3·4	47·8	40·5	3·4	—	3·4	—
6	29	M	D	2	+69	+66	10·5	7·9	7·7	8·3	1·1	2·6	74·5	70·5	1·26	1·5	1·18	1·43
7	35	F	D	2	+57	+46	11·8	14·8	3·1	6·3	1·1	1·1	66·1	82·4	2·83	2·49	2·75	2·28
8	48	M	D	18	+37	+55	9·6	8·5	4·1	7·0	1·0	2·0	75	67·3	1·87	1·86	1·86	1·6
9	40	F	N	5	+30	+47	—	—	6·4	6·3	0·9	1·1	70·6	86·5	0·86	—	0·97	—
Normal Range							3·5–7·5		25–50		7–20		19053		<0·6		<0·3	

D = Diffuse goitre. N = Nodular goitre. * Lowest of three measurements. C = During control period. T = At termination of treatment.

slight it was apparent clinically and on each of the laboratory assessments of thyroid function.

Reduction in the size of the goitre was thought to have occurred in Case 3 during the first fortnight of treatment, but further reduction was not seen, although corticotrophin was given for another three weeks. The goitres of the other patients did not alter in size nor was any lessening of proptosis noted.

Although in Case 8 the patient, who had a typical thyrotoxic myopathy, showed no improvement in the hyperthyroid state, a definite increase in the power of the affected muscles occurred during treatment. The electromyographic abnormalities, however, persisted unchanged.

The results in the patient treated with prednisone (Case 9) were equally negative.

Discussion

Hill *et al.* (1950) treated six patients suffering from Graves's disease with corticotrophin in doses of 40 to 200 mg. a day for 5 to 23 days. Two showed an improvement amounting almost to complete remission, in two there was some reduction in hyperthyroidism on laboratory tests only, while two showed no improvement in any respect. Engel (1950) reported a single case of hyperthyroid heart disease in which a 10-day course of corticotrophin produced an immediate improvement in the general condition and was followed in three weeks by disappearance of all clinical evidence of thyroid overactivity. Excellent clinical responses to corticotrophin in single patients were also noted by Means and Stanbury (1950) and by Sideman (1951), although the latter's case relapsed two months after the end of treatment.

Szilagyi, McGraw, and Smyth (1952) investigated the effect of corticotrophin on five patients with hyperthyroidism who had proved unmanageable by the usual medical measures. A definite improvement in the laboratory tests accompanied by slight clinical improvement was noted in one case, deterioration occurred in another, and the three remaining patients showed no clear response. Similarly unsatisfactory results were described by Werner (1950), who treated two patients, and by Moseley and Merrill (1950) and Charvat *et al.* (1952), who reported single cases. More recently Wisniewski and Górowski (1957) gave corticotrophin as a preparation for thyroidectomy to five patients who were intolerant of antithyroid drugs. A reduction in hyperthyroidism was seen in four of the cases. Euthyroidism was never achieved, and relapse quickly followed cessation of therapy.

Thus in 10 of 23 patients with hyperthyroidism significant clinical benefit was obtained from the use of corticotrophin therapy, and this does not accord completely with our experience of only one moderately successful result after the treatment of eight patients. The fact that none of the authors of the single case reports have subsequently described larger series implies that the promise of their earlier successes has not been fulfilled. An unexpected feature revealed by the analysis of the published results of corticotrophin treatment was the reduction in the size of the goitre in eight patients, often without any reduction in the hyperthyroidism. A doubtful effect was observed in only one patient in our series. The apparent improvement in muscle power in our patient with thyrotoxic myopathy is probably a non-specific effect; Maczynski and Sporny (1956) have described a temporary improvement in general strength in a hyperthyroid patient given 90 mg. of corticotrophin over 20 hours.

There have been several descriptions of the use of corticotrophin and adrenocortical steroids in malignant exophthalmos and in thyrotoxic crisis. In the former most writers agree that a reduction in the local oedema occurs without any improvement in proptosis or ophthalmoplegia. In the latter all observers believe that corticotrophin played an important part in ensuring and accelerating recovery, although all admit that, as other forms of therapy were given concurrently, clinical impressions form the only evidence for this beneficial effect.

The assessments of the function of the adrenal cortex in our patients (Table II) confirm the studies of the majority of preceding workers (Levin and Daughaday, 1955). Two of our cases (Nos. 3 and 4) had definitely subnormal levels of urinary excretion of 17-ketosteroids, while all other patients had levels in the lower ranges of normality. Glucocorticoid activity as demonstrated by the urinary excretion of 17-ketogenic steroids was not significantly abnormal, and the rather low levels found in our cases are not uncommon in patients with normal adrenocortical activity after a short period of bed rest. As Harris and Woods (1956) pointed out, the surprising feature of these findings is that the urinary excretion of adrenal steroids is not increased in hyperthyroidism, a condition in which the patient would appear to be under physical and emotional stress.

TABLE II.—*Adrenocortical Function in Nine Hyperthyroid Patients*

Case No.	Sex	17-Ketosteroids* (mg./24 hours‡)	17-Ketogenic Steroids† (mg./24 hours‡)
1	F	6·5	9·5
2	M	7·0	12·3
3	F	2·0	6·4
4	F	2·4	5·5
5	F	6·3	8·6
6	M	8·2	11·1
7	F	6·3	6·4
8	M	6·0	12·0
9	F	9·1	12·1

* Method of Norymberski *et al.* (1953). Normal (80%) range: males, 7–20; females, 5–15.
† Method of Gibson and Norymberski (1954). Normal (80%) range: males, 5–18; females, 5–15.
‡ Mean of at least two estimations.

It would seem, therefore, that significant improvement in hyperthyroidism is not to be expected after corticotrophin treatment, except possibly in mild and early cases. For these patients other more satisfactory and safer methods of treatment are available. In patients whose preoperative management is difficult or who develop thyrotoxic crises, the addition of corticotrophin to other therapeutic measures is probably worth while.

Summary

There is much evidence for the association of adrenal cortical underactivity with hyperthyroidism.

Nine hyperthyroid patients had subnormal or low levels of urinary excretion of 17-ketosteroids. The excretion of urinary 17-ketogenic steroids was not reduced.

Eight of the patients were treated with corticotrophin in full doses for two to five weeks. Only one patient showed any significant clinical benefit; this was accompanied by an improvement in all laboratory tests of thyroid overactivity. The ninth patient received treatment with prednisone without benefit.

The radioiodine studies and urinary steroid estimations were carried out in the laboratories of Professor F. T. G. Prunty, to whom we are grateful. We also thank Dr. R. V. Brooks and Dr. J. S. Staffurth for their assistance and Dr. W. J. Griffiths for laboratory facilities.

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WAX KERATOSIS IN CHILDREN'S EARS

BY

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It was some time before penicillin became easily available in forms which could be used by general medical practitioners, but once this happened it was used freely in the treatment of acute otitis media. In 1953 it was stated that nearly all such cases were being treated by general practitioners, only the failures being seen by otologists (Black, 1954). One of the causes of failure was due to a mistaken diagnosis in that the patient—a child—did not have otitis media, but infection and suppuration in a mass of wax deeply impacted in the external auditory canal. It had long been known that wax did occasionally become impacted against the tympanic membrane, where it became covered by sheets of desquamated epithelium, and we had come to call this a "wax keratosis." This was thought to be the early stage of the so-called keratosis obturans, a condition well enough known to appear in the textbooks, although there was discussion about its cause and origin and even about its nature.

This wax keratosis seemed to be of interest in itself, in that we did not know how the wax got into the deeper external auditory canal, nor quite what troubles it could cause when it got there. Another curious feature was a known association with chronic respiratory tract suppuration, that of sinusitis and bronchiectasis. Morrison (1956) stimulated further interest with a paper on keratosis obturans, in which he suggested an explanation for the presence of the wax against the tympanic membrane and noted some of the facts of the condition.

Altogether, it seemed to justify some attempt at obtaining further facts, and accordingly an analysis of a collection of such cases has been made, and this forms the basis of the present paper.

Incidence and Location of Wax in Children's Ears

It was important at the outset to have some information concerning wax in children's ears, whether normal or otherwise.

The hair follicles and glandular elements in the skin of the external auditory canal are confined essentially to its outer half or so. Collins (1951) supported previous views that the waxy or more solid secretion of the sebaceous glands is softened by the secretion of the ceruminous glands so that it can find a way to the outside. Therefore it would be expected that wax would normally be found in the outer part of the external auditory canal or not at all (Fig. 1).

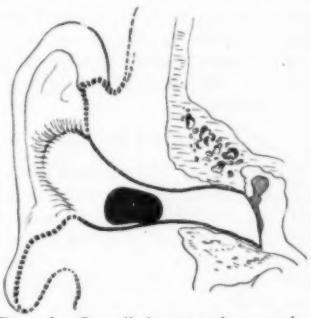

FIG. 1.—So-called normal wax in outer half of external auditory canal.

An investigation was carried out in 1,000 consecutive children seen for the first time in 1957 in three E.N.T. out-patient departments, perhaps not an entirely normal cross-section of the whole. Three different classes were recognized in these children, as follows: (1) no wax present anywhere in the external auditory canals; (2) wax present in the area which normally produces it; and (3) wax impacted in the deep part of the external auditory canals—that is, wax keratosis.

TABLE I

Class	First Series		Second Series	
	No. of Cases	%	No. of Cases	%
1	828	82·8	489	88·4
2	146	14·6	45	8·1
3	26	2·6	19	3·5
Total	1,000	100·0	553	100

A further series of over 500 children were seen in two more E.N.T. out-patient departments. The results in the two series are shown in Table I. It will be seen that 2.6% of the first series had wax firmly impacted against the tympanic membrane. When the wax was removed under general anaesthesia from these 26 children, 14 were found to have a well-formed wax keratosis, and in the remaining 12 the wax had formed a complete cast of the canal, but no epithelial envelope was present as yet. It is probable that these 26 cases represent degrees of the same process, which has been termed wax keratosis. In the second series 3.5% showed the presence of a wax keratosis.

It will be seen that these two series bear a striking similarity, and confirm the incidence of wax keratosis in about 3% of all children attending an E.N.T. out-patient department for a variety of reasons.

Definition and Description of Wax Keratosis

A wax keratosis has been described above as being a mass of wax impacted against the tympanic membrane in the deep part of the external auditory canal. It loses its natural brownish-yellow colour to become black and hard, and desquamated squamous epithelium forms a white envelope around it. The condition is usually present in both ears, and it can easily be missed unless a careful examination is made, as the outer half of the external auditory canal is normally free from wax, and the external surface of the wax keratosis tends to be concave (Fig. 2), so as to simulate the appearance of the tympanic membrane. Moreover, we have gained the impression that in cases of wax keratosis the outer half of the external auditory canal is narrow, making examination of the deeper part difficult.

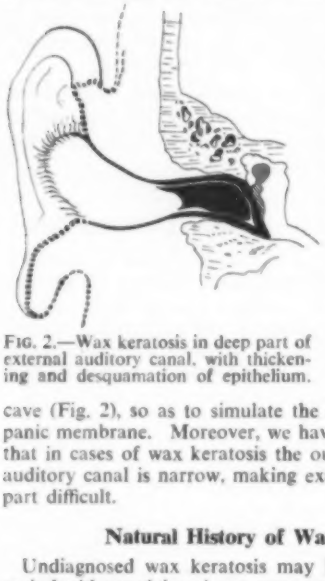

FIG. 2.—Wax keratosis in deep part of external auditory canal, with thickening and desquamation of epithelium.

Natural History of Wax Keratosis

Undiagnosed wax keratosis may lie dormant for a long period without giving rise to any symptoms apart from slight deafness, although even this may not be apparent. Audiometer examination suggests that only about 20 decibels of deafness occurs. During this period the surrounding envelope merely becomes thickened by further desquamation of the epithelium.

This process may progress to a stage where the wax keratosis becomes so firm as to erode by pressure alone, first the epithelium of the deep external auditory canal, and then the bony canal itself, giving rise to a true keratosis obturans. A period of many years may elapse before its ultimate discovery, possibly in an adult patient.

The wax keratosis may become infected. This condition can be cured by softening the mass, which is then extruded from the canal during suppuration, leaving a normal tympanic membrane.

Again, granulations may form so as to obstruct the external auditory canal and hide the infected wax keratosis from view. If allowed to go untreated a ring of granulation tissue may form at the junction of the external surface of the wax keratosis and the outer part of the auditory canal. A type of false membrane then develops.

Recurring or chronic suppuration may persist for a long time and cause mistakes both in diagnosis and in treatment. The real condition may become evident only after surgical removal of aural polypi, when it is realized that the trouble is all external to the tympanic membrane. Usually a large polypus, when it occurs, arises from the annulus, and removal leaves a normal tympanic membrane. All trace of wax and keratosis may have disappeared. A great help in the diagnosis is the presence in the other ear of a clean wax keratosis.

Analysis of Cases

The 90 cases available for study included those found during the survey already discussed, along with others previously on record as known cases of wax keratosis. An attempt has been made to analyse these cases, especially with a view to demonstrating conditions which may occur in association with them. These conditions justify an examination of the ears so as to allow early treatment of wax keratosis if it is found.

1. Presenting Symptoms

The reason for the attendance of the child at an E.N.T. out-patient clinic in those cases where a wax keratosis was demonstrated is shown in Table II.

TABLE II

Cardinal Complaint	No. of Cases	%
Deafness	20	22·2
Otorrhoea	17	19·0
Earache	4	4·5
Nasal catarrh	36	40·0
Recurrent tonsillitis	13	14·3
Total	90	100

It is significant that more than half these children were referred without any aural symptoms at all, usually with a history of recurrent sore throat or of a chronic nasal discharge. In these cases the wax keratosis was found on routine examination of the ears. In only two cases in which deafness was the reason for the child's attendance was there a request from the referring general practitioner for removal of impacted wax, for which treatment by softening and syringing had failed. In most of these deaf children post-nasal adenoidal obstruction or previous attacks of otitis media were thought to be the cause of the impaired hearing. When otorrhoea was present it was usually unilateral, and the history was one of failure to respond either to systemic antibiotics, given on the assumption that the cause was acute middle-ear suppuration, or to local treatment, given in an attempt to dry up a chronic suppurative otitis media.

In all groups the most frequent reason for attendance at an E.N.T. out-patient clinic was a request from the medical practitioner for the possible removal of tonsils and adenoids.

2. Condition When First Seen

Out of the 90 children known to have wax keratosis, both ears were affected in 81 cases, and in the other 9 there was a unilateral wax keratosis without any wax at all in the other ear. When the ears were cleaned out under general anaesthesia 68 of the 81 children were found to have a definite wax keratosis in both ears, whilst in the remaining 13 wax was present in the deep external auditory canal but had not yet become surrounded with desquamated epithelium. In the nine children where only one ear was affected, three gave a history of otorrhoea in the unaffected ear which may have given rise to spontaneous extrusion of a wax keratosis, and one was known to have had treatment to the ear elsewhere. Out of the 21 children presenting with otorrhoea or earache, 16 were found to have an acutely infected wax keratosis in one ear, with the formation of granulation tissue.

Several of the children, seen mainly because of aural symptoms alone, and before the relationship with respiratory infection was fully realized, did not have full investigations of their chest and sinuses. These investigations were carried out in 73 children, and the incidence of respiratory suppuration in these children is shown in Table III.

TABLE III

Cardinal Complaint	No. of Cases	Suspected Sinusitis	Obvious Sinusitis	Positive Antral Lavage	Known Chest Lesion	Total with Sinusitis or Chest Lesion
Deafness	15	5	7	11	6	13
Otorrhoea	11	5	4	7	10	11
Earache	4	—	4	4	2	4
Nasal catarrh	36	10	26	29	21	31
Recurrent tonsillitis	7	4	2	5	3	6
Total	73	24	43	56	42	65

Those children who had frank pus in the nose have been listed under "obvious sinusitis." When sinusitis might have been suspected from the history, but the nose was clean, the child was listed under "suspected sinusitis." Many

of these cases showed the presence of pus in the antra when lavage was undertaken. The chest lesions were of all grades, varying from a minor radiological change, usually at the base of the lung, to an advanced bronchiectasis.

It will be noted that 65 (89%) of these children were found to have either a sinus suppuration or a chronic respiratory infection or both.

3. Management

When the implication of the presence of a wax keratosis had been realized a routine procedure was followed in all cases.

Under general anaesthesia both ears were inspected, and the wax present in the deep part of the external auditory canal was removed. This was usually a most difficult procedure owing to general narrowing in the outer part of the canal and the very firm impaction of the wax in the depths beyond. Often this came out as a complete cast of the canal even to the imprint of the handle of the malleus, but occasionally difficulty was found in separating the epithelial envelope from the canal wall, and especially from the tympanic membrane. In these cases only the inner core of wax was removed, leaving the envelope to be extruded later by the normal physiological process of desquamation. Any granulation tissue present was removed by suction at the same time. Proof puncture and antral lavage of both maxillary antra were then performed, revealing in most cases an underlying suppuration requiring further treatment.

Many children had a productive cough which obviously needed treatment, but in those children in whom a chest condition was not so obvious a routine examination, including a chest *x*-ray examination, was carried out. In this manner about half of the children were found to have an unsuspected chest lesion.

4. Treated Prognosis of the Ears

It is not our intention to discuss the results of treatment of the sinusitis or of the coexistent chest lesion. This treatment is essential, and it has been evident that in children in whom respiratory suppuration remains a wax keratosis can re-form. Probably an important result of this investigation has been to emphasize the likely primary nature of the respiratory infection and the great difficulties experienced in its treatment. Many cases of unsuspected sinusitis and bronchitis have been discovered which would otherwise have continued untreated.

With regard to the ears, they will usually return to normal. When a non-infected wax keratosis has been removed, the tympanic membrane may appear opaque and thickened at first, especially when the outer envelope of the wax keratosis remains attached to it. Gradually this envelope is thrown off and the tympanic membrane becomes perfectly normal in all respects. Any deafness which was present has normally been due to the simple action of the wax keratosis as a foreign body, and the hearing returns to normal when it has been removed.

When the wax keratosis has become infected and granulation tissue has formed, local antiseptic drops may have to be used after the wax keratosis and the granulations have been removed. Once the pressure of the epithelial lining of the external auditory canal has been relieved there is no stimulus to the formation of granulation tissue, and in these children as well the ear soon returns to normal.

So long as the associated respiratory suppuration is treated and cured there will be no re-formation of the wax keratosis, and thus we hope that keratosis obturans will be prevented.

Summary

Wax keratosis, if looked for, will be found in about 3% of children attending an E.N.T. department for any reason.

It is almost universally bilateral.

In half the cases there will be no suspicion of any lesion in the ears until they are examined.

Respiratory suppuration (sinusitis, bronchitis, bronchiectasis) will be found, if looked for, in nearly all cases.

The wax keratoses must be removed to prevent the possibility of any future infection, with local suppuration or progression to keratosis obturans. General anaesthesia will be required for this removal and will allow the opportunity for antral lavage.

Chronic suppuration with polypus formation can occur and simulate chronic suppurative otitis media.

Early removal, associated with concurrent and subsequent treatment of any respiratory suppuration present, will result in an ear normal in appearance and in function, with no likelihood of recurrence.

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PHYSIOTHERAPY FOR BELL'S PALSY

BY

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Bell's palsy can be defined as unilateral paralysis of the facial muscles resulting from an intrinsic lesion of the seventh cranial nerve (Cawthorne, 1951). There is general agreement that 70 to 80% of these patients recover completely within one to three months, while the remainder develop various sequelae (Taverner, 1955). There is no agreement about treatment, although many methods have been tried. At present electrical stimulation of the paralysed muscles is widely used, at least until voluntary movement reappears. This practice is supported by many of the standard textbooks (Collier, 1948; Evans, 1951; Nielsen, 1951; Elliott, Hughes, and Turner, 1952; Wilson, 1954; Brain, 1955; Wechsler, 1958), but Walshe (1952) states that galvanism is useless.

There is apparently no record in the literature of a controlled trial of the value of electrotherapy in facial palsy, and the present investigation was undertaken because daily electrotherapy is expensive and time-consuming. It was felt to be justifiable to withhold physiotherapy from the control patients because previous experience has shown that lack of physiotherapy does not necessarily prejudice recovery from peripheral nerve injuries (Henderson and Taverner, 1949).

Design of the Trial

All patients with Bell's palsy of less than 14 days' duration seen in the department of electromyography of the General Infirmary at Leeds from October, 1954, to December, 1956, were included in the trial. The diagnosis of Bell's palsy was made on the basis of the following

three criteria: (1) complete or partial paralysis of the muscles of expression of the whole of one side of the face of sudden onset; (2) absence of any symptom or sign of any other disease of the central nervous system; and (3) absence of any symptom or sign of any disease of the ear or posterior fossa. The patients were examined clinically and electromyographically throughout the course of their disorder. The degree of paralysis was estimated visually as a percentage of the function of the normal side. This method proved reasonably consistent from visit to visit, but was supplemented by photography under standard conditions in many patients.

The electrical examination consisted of concentric needle electrode exploration of the facial muscles without local analgesia. The electrical activity was amplified and recorded with conventional electromyographic equipment. In some patients supplementary studies of neuromuscular excitability were made with a Ritchie-Sneath stimulator.

Denervation of the facial muscles was established by the presence of fibrillation activity in the electromyogram, by abnormalities in the strength-duration curves, and by the subsequent development of abnormalities of the facial musculature during recovery (cf. Taverner, 1955).

All the patients were instructed to massage the face daily, but about half of them, by random allocation from a prepared list, were given daily galvanism by one of us (J. M.). Each patient received infra-red radiation to the affected side of the face at 2 ft. (60 cm.) distance for 10 minutes. The skin was prepared with soap and warm water, and interrupted galvanism was then applied from a Ritchie-Sneath stimulator, using saline electrodes. Each facial muscle in turn was stimulated to 30 minimal contractions with a pulse of 100 msec. duration. This was repeated three times, giving 90 contractions a muscle. In some patients with severe denervation of the facial musculature the muscles tired quickly and the number of contractions was then reduced to not fewer than 30 in three groups of 10. The muscles stimulated were frontalis, corrugator supercilii, orbicularis palpebrarum, levator labii superioris alaeque nasi, levator labii superioris, levator anguli oris, risorius, orbicularis oris, depressor anguli oris, depressor labii inferioris, levator menti. Treatment was given daily until active contractions returned and then thrice weekly until recovery was virtually complete or, in the event of denervation, until the condition seemed stationary. Treatment for patients with denervation lasted from two to six months.

Findings

Of the 86 patients admitted to the trial, three were eventually rejected—two because of failure to reattend, and one because of failure to complete treatment owing to illness. Of the 83 patients studied, 43 received physiotherapy, and 40 were used as controls. The age, sex, and duration of facial palsy did not differ significantly between the two groups (Table I).

TABLE I.—*Mean Values for Age, Sex, and Duration of Facial Palsy When First Seen. Range in Parentheses*

	Whole Group	Treated	Control
Age	37·5 years (3–79)	39·5 years (3–79)	35·6 years (7–73)
Sex	M.40; F.43	M.22; F. 21	M.18; F.22
Duration	5·2 days (1–14)	5·2 days (1–14)	5·2 days (1–14)

It is known that when facial palsy is due to conduction block of the facial nerve no sign of denervation is found and recovery is complete in from one to three months. If denervation of the facial muscles develops, improvement is slower and complete recovery never occurs (Taverner, 1955). The patients in this trial were divided, for purposes of analysis, into those with and those without electromyographic evidence of denervation (Table II). Proportions with conduction block and denervation did not differ significantly between the two groups.

TABLE II.—*Proportions with Denervation and Conduction Block in Treated and Control Groups*

	Conduction Block	Denervation
Treated	23 (54%)	20 (46%)
Control	27 (68%)	13 (32%)

All the patients with conduction block recovered completely, and the time taken is shown in Table III. The clinical course of patients with conduction block was almost identical in treated and control groups, both in the time taken to initiate movements and in the time to complete recovery.

TABLE III.—*Mean Time in Days From Onset of Facial Palsy to First Visible Movement and to Full Recovery in Treated and Control Groups. Range of Observations in Parentheses*

	Initial Movement	Full Recovery
Treated	10 (3–21) days	43 (14–90) days
Control	11 (2–21) ,,	39 (14–134) ,,

The patients with denervation never recovered completely, and most of them were treated for much longer periods than those without denervation. The times from onset of palsy to first movement were 53 days (range 10–104) in the treated group and 66 days (range 14–90) in the control group. These patients were observed for at least a year or until no further recovery could be detected. The final degree of recovery of voluntary power was assessed visually as a percentage of that of the normal side. An overall estimate of facial movement was made by halving the sum of the percentage estimates of function for the frontalis and orbicularis oris muscles. The last assessments of percentage recovery in the two groups are presented in Table IV. Proportions showing varying degrees of recovery do not differ significantly between the two groups.

TABLE IV.—*Estimated Voluntary Power After Maximal Recovery of Denervated Facial Musculature. Figures in Parentheses are Percentages of Respective Totals*

	Total	<25%	25–75%	>75%
Treated	20	3 (15%)	11 (55%)	6 (30%)
Control	13	3 (23%)	6 (46%)	4 (31%)

The presence of contracture of the facial muscles was carefully recorded. This appears only after denervation, and its occurrence could not be related to the electrical treatment. Eleven (26%) of the treated group and eight (20%) of the control group developed contracture.

Discussion

The treated and control groups are similar enough to enable useful comparisons to be made. The three defaulters would have added two to the control group and one to the treated group and could scarcely have affected the issue. The results in the two groups are so similar that it is unlikely that electrical treatment can be of importance in the management of facial palsy. The cost to the community and to the patient of daily visits to hospital for electrotherapy does not seem justified on the present evidence. It has been suggested that physiotherapy is valuable for maintaining the morale of the patient. It has been found, in the management of several hundred patients with facial palsy, that if a firm prognosis and careful explanation and reassurance are given then full confidence is maintained.

Summary

A controlled trial of the value of galvanic stimulation in the management of Bell's palsy is reported. Eighty-six successive patients were randomly allocated to treatment and control groups. Eighty-three of them were studied until recovery was complete or for at least one year.

Treatment consisted of infra-red radiation followed by interrupted galvanism to 11 individual facial muscles on the affected side. Treatment was given daily at first and later thrice weekly.

No significant advantage could be demonstrated from the use of galvanic stimulation for Bell's palsy.

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LAXATIVE EFFECT OF SORBITOL

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As sorbitol is now available commercially and is being used increasingly in food products, its metabolism and other physiological characteristics are of some importance. Apart from its value as a diabetic sugar it is useful in confectionery as a humectant and plastifier and for increasing the shelf life of the products. Its metabolism has been studied extensively and further work is in progress. In the course of this work it has been observed that, like other sugars of its kind, it exerts a laxative effect, particularly noticeable in large dosage. An attempt to define the threshold dose was made by Ellis and Krantz (1941), who found that by trial on 12 subjects the minimum dose to produce soft or watery stools was about 50 g. a day for the crystalline product and 20–30 g. a day for the 70% syrup (the crystalline compound being much superior in quality to the syrup).

In view of the small number of subjects previously used in these tests the results can hardly be regarded as representative for the general population. We therefore decided to apply tests to a larger number of volunteers to determine the effects at a specified dosage.

Method

Dosage Consideration.—A prerequisite of the tests was that they should not unduly affect the majority of subjects, but should indicate exceptional susceptibility if such should exist. A trial approach was made on three apparently normal subjects, one at a dosage of 50 g., and the other two at 25 g. Only the higher dosage showed spectacular results, and the test level chosen was therefore 25 g. a day.

Of the 101 volunteers taking part, 15 failed to complete the test for reasons unconnected with the effect of sorbitol. Control was obtained by the provision of a glucose solution with an addition of saccharin to match the sweetness of the sorbitol. The volunteers were accepted *en bloc* and no planned distribution of age group, sex, etc., was arranged.

The test consisted in taking 12.5 g. of either sorbitol or glucose after meals twice daily for seven days, half of the panel taking sorbitol and the other half glucose, and then changing over to the other substance for a second week. So far as the subjects were concerned, the solutions were identical in appearance, colour, and taste.

The solutions were: (1) a 50% w/v solution of glucose in water and (2) a 50% w/v solution of sorbitol in water to which was added 0.04% w/v of saccharin (based on the sorbitol content).

Each subject was given a supply of test solution sufficient for one week and invited to complete a questionary day by day. The 101 volunteers are accounted for as follows: completed tests both weeks, 84; tests not completed owing to alleged effects of sorbitol, 2; tests not completed for reasons not connected with sorbitol, 8; tests not started for personal reasons, 7.

Results

Analysis of the factors, such as rotation of dosage, method of dosage (as supplied or in a beverage, etc.), age group, occupation, marital status, and some others, not all of which are analysed in the accompanying Table, did not

Table of Results

Occupation	Status	Solution Used	Age Groups: Under 30 Sub.	Under 30 Mot.	Over 30 Sub.	Over 30 Mot.	Totals Sub.	Totals Mot.
Active	Single	Glucose	3	21	1	11	4	32
	"	Sorbitol	3	21	1	9	4	30
	Married	Glucose	4	25	30	236	34	261
	"	Sorbitol	4	23	30	262	34	285
Sedentary	Single	Glucose	12	94	2	13	14	107
	"	Sorbitol	12	90	2	17	14	107
	Married	Glucose	7	48	25	223	32	271
	"	Sorbitol	7	53	25	273	32	326
	Totals	Glucose	26	188	58	483	84	671
		Sorbitol	26	187	58	561	84	748

Sub.=Subjects. Mot.=Motions.

reveal any significant effects. In view of this the significant differences between sorbitol and glucose (standard deviation, 4.99 and 2.95 respectively; DF, 83) must be attributed to some other factor not disclosed in the group allocations.

By inspection three results were seen to be outstandingly divergent from the general run. A recalculation of standard deviation of the glucose and sorbitol series after eliminating these cases gave a standard deviation of 2.90 for glucose and 2.95 for sorbitol (DF, 80) indicating that the two series show no significant difference.

A fuller statistical analysis of the factors and interactions was found to be beyond our competence owing to the complications of disproportionate class numbers.

Inspection of the observations on "wind" showed a definite tendency to flatus due to sorbitol.

Comment

Olmsted (1953) commented on the results of Ellis and Krantz (1941) and suggested that sorbitol may be a physiological laxative in the sense that it is a substrate for the colonic bacterial populations. It has been shown, however, that, in general, sorbitol is a poor nutrient for the more common bacteria, and it seems more likely that its humectant properties are the cause of the laxation observed at higher dosages.

We conclude that sorbitol administered in a split daily dosage of 25 g. does not cause laxation in the general population, but specific reactions may be expected from about 5% of the subjects. In practice it has been noticed that the presence of fats in foodstuffs allows much larger doses to be tolerated without laxative effects. In view of the increasing use of this product in the confectionery trade, it might be well to bear in mind the possibility of a sorbitol sensitivity as a cause of diarrhoea in an otherwise healthy subject.

Summary

The laxative effect of sorbitol was compared with the control glucose at a dosage level of 25 g. a day for 86 subjects; observations included the number of motions, and incidence of wind and of discomfort or pain. Discomfort and marked laxation were experienced by five subjects, two of these failing to complete the test. The remainder showed no significant difference from the glucose control with the exception of a slight tendency to wind after ingesting sorbitol. No known diabetics were allowed to participate in the tests.

Acknowledgment is made to Messrs. Howards of Ilford Ltd. for assistance in facilitating these tests.

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Medical Memorandum

A.T.S. Cervical Polyradiculitis Treated by Cortisone

Neurological sequelae of serum therapy are well recognized. Miller and Stanton (1954) analysed the hundred adequately documented cases. Of these, 59 had brachial plexitis, 15 had other forms of radiculitis (radicular neuritis, mononeuritis, shoulder-girdle neuritis), 10 had polyneuritis, 6 had Landry's paralysis and myelitis, and 10 had cerebral and meningeal manifestations. Moynihan (1955) found that one patient developed peripheral neuritis in 7,580 cases given prophylactic A.T.S. (antitetanus serum).

These syndromes are severe complications. "Progress may be slow, and, while improvement in patients with plexus and single-nerve involvement may start in a month, complete recovery may be prolonged up to two years. According to most writers, about 20% of patients never achieve a complete return of function" (MacGibbon, 1955).

As these syndromes are believed to have an allergic basis, an anaphylactic hypersensitivity, and as cortisone has been successful in non-neurological drug-hypersensitivity states (Carey *et al.*, 1950) and in encephalomyelitis following antirabies vaccine (Garrison, 1952), it is important to assess the value of steroid therapy in serum neuritis.

Cortisone had no effect on peripheral neuropathy which developed after A.T.S. in a patient (Walsh, 1952), but here the cortisone was not given until the third day of muscular weakness, and then only 50 mg. intramuscularly twice daily for 10 days. However, Shulman *et al.* (1953) produced a complete remission in a case of A.T.S. sciatic neuritis with a single intravenous infusion of corticotrophin; and Shafer (1957), using oral prednisone, 5 mg. six-hourly, relieved the pain in a case of A.T.S. shoulder-girdle neuritis in one day, with return of muscle power to normal in 10 days.

CASE REPORT

A sergeant, aged 36, cut his right hand on March 22, 1957. The wound was sutured but became infected, and on March 29 he was given injections of A.T.S., 1,500 units, in his right arm, and of fortified procaine penicillin, 1 ml. twice daily, in his buttocks, on that and the next two days. On April 4 he noticed that his right arm was itching, swollen, and red. At 10.30 that night an aching pain began in the left side of his neck, and spread gradually down the back, into the calf, and from the left shoulder down the arm to the elbow. These pains became worse when he moved the shoulder or sat up. Although he felt quite well otherwise, these aches were severe enough to make him come for admission to the Royal Herbert Hospital, Woolwich, at 3.30 a.m. on April 5. The only significant features of the history were that he was left-handed, that he had had penicillin injections before with no ill effects, and had been given tetanus toxoid-antitoxin in 1937 and tetanus toxoid in 1938, 1939, 1942, and 1944.

On examination he was distressed and in obvious pain. His whole body with the exception of his head was covered with a fine erythematous eruption. He was afebrile, the scar on the right hand was soundly healed, and there was no swelling or tenderness at the sites of the injections. There were no other abnormal signs in the central nervous or any other system.

The haemoglobin, total and differential white-cell counts, and, later, *x*-ray films of the chest and cervical spine were normal. A diagnosis of serum sickness was made, and promethazine hydrochloride, 25 mg. six-hourly, was given.

By the following day (April 6) the rash had disappeared and the only pain was in the left upper limb, which he then noticed had become weak. There was no wasting or fasciculation, but tenderness of the muscles of the left upper arm was present and also profound weakness of the left pectoralis major, infraspinatus, deltoid, biceps, triceps, and brachioradialis, the flexors and extensors of the wrist and fingers, and the small muscles of the hand. The left supinator and biceps jerks were absent and that of the triceps was much reduced. There was impairment of superficial sensation over the radial side of the left lower forearm, the thumb, and index finger in the distribution of C 6 dermatome. It seemed clear that the patient had serum neuritis, with a unilateral cervical radiculitis involving the left C 5–8 and T 1 roots, especially C 6. He was given cortisone by mouth, beginning with 75 mg. six-hourly.

By the next morning (April 7) the aches were much less, and his power had improved remarkably both subjectively and objectively, while the sensory impairment was confined to a small area on the radial side of the left wrist and over the first metacarpal bone. The cortisone was decreased to 200 mg. that day, and the next morning he had some recurrence of pain in both shoulders. His power had continued to improve, and he was given 100 mg. of cortisone that day. On April 9 power and sensation were normal and his deep reflexes had all returned, though still reduced. The cortisone was continued at 100 mg. that day and then gradually tailed off over the next fortnight, so that he received a total of 1,175 mg. over 18 days.

On discharge from hospital on April 26 his only complaint was of slight ache over the left deltoid. One month later he was well and symptom-free; the only abnormal sign was a slightly decreased left biceps reflex.

COMMENT

In view of the unfavourable prognosis of serum neuritis it seems reasonable to attribute the rapid recovery in this patient and in those of Shulman *et al.* and Shafar to the use of cortisone, corticotrophin, and prednisone respectively. Such dramatic response lends support to the suggested "allergic" basis in this condition, and would suggest that early and sufficient steroid therapy is the most hopeful treatment available for serum neuritis. In the identical clinical picture of localized neuritis of the shoulder girdle or neuralgic amyotrophy (Spillane, 1943; Parsonage and Turner, 1948; Turner and Parsonage, 1957), when the miscellaneous precipitating factors include trauma and infection, it would seem worth while to attempt steroid therapy if it could be given as early as possible in the course of the disease.

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Lieutenant, R.A.M.C.

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Reviews

GENERAL PSYCHOPATHOLOGY

An Introduction to Psychopathology. By D. Russell Davis. (Pp. 388+vi. 30s.) London: Oxford University Press. 1957.

We have long lacked in Great Britain any book on general psychopathology which can be recommended with confidence to the student. In this way we are badly handicapped in comparison with Germany, for instance, where in every textbook of psychiatry a substantial part of the whole volume is given to this part of teaching. What we have had instead is a number of works, many of them of great excellence, on psychopathology in the limited Freudian sense. Dr. Russell Davis has now supplied the deficiency with a book which covers the whole ground and is so lucid and intelligent that it is a pleasure to read. The author's basic tenet is that the most promising line of advance in psychiatry at the present time lies in the application of the findings of experimental psychology. His book is essentially the discussion of mental illness in the context of psychological theories. This is done with great ability, and the evidence has been collected and presented in a critical and stimulating way. Nevertheless the result is a work which is, as the author himself admits, somewhat one-sided in nature. The lack of appreciation felt for observations and theories along physical, medical, and genetical lines constantly involves him in difficulties. In presenting the hypothesis of a purely environmental and psychological causation for some condition he has to say that "there is little conclusive evidence with which to support it" or that it "would be possible to deny any weight to the arguments from which the theory has been built up." Though it is always made clear to the reader when the author's partialities are taking him beyond the evidence, one cannot but regret that a more judicial attitude was not found possible.

Despite these criticisms, this is an excellent and important book. It will not escape the thoughtful reader that in the present state of knowledge the psychological theories cannot bear the whole of the weight that is placed upon them. Yet the author has collected a mass of data, especially from the fields of experimental psychology and sociology, which are not easily available to psychiatrists, and he has pointed out lines of approach which may very well prove fruitful. Teachers and students are alike in his debt.

ELIOT SLATER.

CHEMOTHERAPY

The Strategy of Chemotherapy. Eighth Symposium of the Society for General Microbiology, held at the Royal Institution, London, April, 1958. Edited by S. T. Cowan and E. Rowatt. (Pp. 360+ix. 35s.) London: Cambridge University Press. 1958.

The title of this symposium evokes ideas of therapeutic policy. When is it better to attack promptly, and when to delay a declaration of war until an ally, the normal body defences, has mobilized and gone into action? Should the entire force be engaged in the hope of a single decisive action, or should there be a strong reserve or a deliberate policy of attrition? When is a combination of different arms to be preferred to deploying a single one? If there are two enemies, should they be engaged successively or together? At what point does the devastation caused by a campaign outweigh the fruits of victory? How far is it wise to go on provoking a fresh enemy to declare a war of superinfection? Perhaps these are matters of tactics, but the reader who looks for them here will be disappointed. Most of the 14 British and five American contributors are concerned either with the design of weapons used in this sort of war or with the kind of injury they inflict. There are those which destroy the bacterial cell wall or interfere with its construction, those which interfere with the metabolism of either carbohydrate or protein, and some which divert a metabolic process so that an abnormal and toxic product results ("lethal synthesis"). There are others, it may be added, and not the least useful therapeutically, the mode of action of which cannot be so confidently defined. In the search for new weapons the random method has so far produced everything of any therapeutic importance which we possess; in future the rational method, on some such lines as the contribution here on the designing of antimetabolites, may yield more fruitful results. Several concluding contributions include one devoted very appropriately to the mechanisms of synergy, and others which are general accounts, with some discussion of the causes of failure, of the possibilities of chemotherapy in infections by bacteria, protozoa, and fungi. The authors of the last-named could have been less pessimistic about treating systemic mycoses if they had included some reference to amphotericin.

The Society for General Microbiology is again to be congratulated on publishing in a very handsome volume a series of contributions by experts in the rapidly expanding field shared by the bacteriologist and the biochemist. The progress which is being made in these fundamental studies is on a wide front and equally impressive in its depth. It is interesting that several contributors quote sayings of Ehrlich as directly applicable to the problems of the present day.

L. P. GARROD.

LESSONS IN MEDICAL EDUCATION

Adventures in Medical Education: A Personal Narrative of the Great Advance of American Medicine. By G. Canby Robinson, M.D., LL.D., Sc.D. (Pp. 338+xii; illustrated. 40s.) Cambridge, Massachusetts: Harvard University Press (for the Commonwealth Fund). London: Oxford University Press. 1957.

This is the autobiography of an octogenarian physician who looks back on his full and well-spent life and draws some lessons from his experience. Its main interest lies in the vivid insight it gives into the transition stage of American medical education at the beginning of the present century. Both in Great Britain and in the United States medical education during the past 200 years has gone through three stages—apprenticeship, private medical schools, and university medical schools. Dr. Canby Robinson took a considerable part in helping to make smoother the introduction of full-time academic professors and to lessen the disturbance in the change-over from private to university control in several big centres. Born in Baltimore, and trained at the Johns Hopkins Medical School, where he was inspired by Osler, Welch, Halsted, and Howard Kelly, he served as intern at the famous Philadelphia Hospital and had the good fortune to be appointed the first senior resident physician at the newly opened Hospital of the Rockefeller Institute. From there he went to take the position of associate professor of medicine in the Washington University Medical School at St. Louis, where he played an important part while full-time professors were being installed. Moving on to Nashville in 1920, he took a large share in planning, building, and staffing the new Vanderbilt University Medical School, and from there he went as director of the newly formed association between the New York Hospital and the Cornell Medical College. These experiences entitle Dr. Robinson's opinions to respect, and he is in no doubt as to the value of full-time professorships in medical education, though he appreciates the ever-present difficulty about permitting some private practice.

The generosity of private donors in America at that time was astonishing. From 1910 to 1935 over 500,000,000 dollars were thus contributed to medical education. Yet costs of running the medical schools continue to rise and cause financial worry. Dr. Robinson's later years were spent in research in social medicine, and he has some useful words to say on that branch of the profession. He pays a just tribute to the late Professor Ryle. The last chapter in the book is a useful essay (really a sermon) on medical progress during the last 50 years. He sums up briefly: "Medical education should cultivate the love of

God, the love of man, and the love of truth because these form the foundation on which medicine should be firmly based." Though serious-minded, the author has a sense of humour and relates this story. Chancellor Kirkland was the moving spirit at Vanderbilt University. He was a keen gardener, and one day when, dressed in very old garments, he was working in his garden, a lady who was passing admired the flowers and said to him, "Do you work for Chancellor Kirkland?" Concealing his identity, the Chancellor replied, "No, ma'am; I work for Mrs. Kirkland." One can see why he was made Chancellor.

ZACHARY COPE.

DIATHERMY

The Principles and Practice of Diathermy. By Bryan O. Scott, M.R.C.S., L.R.C.P., D.Phys.Med. (Pp. 193+vii; illustrated. 25s.) London: William Heinemann (Medical Books) Ltd. 1957.

This is a useful book. The author briefly traces the history of the discovery of high-frequency currents and their application to medicine, and then covers succinctly the basic physics necessary for the complete understanding of the subject. Here he succeeds in getting a lot into a small space, and illustrates his points with simple analogies. Chapters on short-wave generators and high-frequency fields follow. The techniques of the introduction of energy into the body are described in full. The effects of high-frequency currents are discussed; these are the heating of the tissues, and the author wisely discounts any-specific effects of short-wave diathermy apart from heat. Indications and contraindications to short-wave diathermy are discussed. A brief chapter describes the dangers of diathermy and their prevention. Surgery is not neglected, and the fundamentals of electrodesiccation, electrocoagulation, and electrosection are given. Finally the techniques of regional application are well and usefully described. Both a glossary and index are provided. The author is generous in his acknowledgments, but it is obvious that he has done much work himself in this field. Both physiotherapists and doctors who are taking up physical medicine will welcome this book.

WILLIAM TEGNER.

STAMMERING

Stuttering: A Psychodynamic Approach to its Understanding and Treatment. By Dominick A. Barbara, M.D., F.A.P.A. (Pp. 255. 25s.) London: Hutchinson Medical Publications. 1958.

This is the third book on this subject that has appeared recently, each one written by a therapist who had himself stammered earlier in life. Dr. Barbara's approach, however, differs from that of his two predecessors in that it was only after several years of training at the American Institute of Psychoanalysis that he was ready to combine his personal experience as a stutterer with Karen Horney's theory of psychoneurosis in the treatment of stuttering. It is not surprising, therefore, that the author's views as to the aetiology of stammering or stuttering are concerned mainly with psychological factors, and that he regards the disorder as primarily due to the anxiety of the stutterer in attempting to adjust himself to other individuals. Treatment, therefore, should not merely consist in vocal exercises and suggestions; it must be directed to the entire personality of the patient. With regard to the designations "stammering" and "stuttering," it is generally accepted in Great Britain that the two terms are synonymous, the former being used almost exclusively in this country and the Dominions, while "stuttering" is preferred in the U.S.A. Dr. Barbara, however, quotes J. S. Greene as stating: "According to the derivations, 'stuttering' stands for laboured, difficult, and hesitant speech with resulting defective conversation, while 'stammering' refers to defects of articulation and should not be confused with 'stuttering'; technically, stuttering is known as dysphemia, while stammering is known as dyslalia." This view, however, has never been held in Great Britain, where the term "dyslalia" is applied to a speech disorder entirely different from stammering or stuttering, while "dysphemia" is sometimes used as an alternative for the latter condition.

The book is evidently intended not only for the professions of medicine and speech therapy but also as a help to families of child stutterers as well as adult sufferers. The incidence of the disorder and the various views concerning aetiology are discussed; also the symptomatology, illustrated by several case histories, is well presented. A chapter is provided on the "Demosthenes complex," as it is termed by the author, and which is defined as a process of self-glorification in stuttering based on an accentuation of anxiety and fears in the speaking situation; thus, in association with the stutterer's particular make-up, there is created an idealized image of his own particular needs. In the treatment of "primary" stuttering (5–10 years of age) the approach is mainly one of treating the parents and through them endeavouring to remove unfavourable influences, to give support, and yet help the child to lessen the degree of his inner turmoil and conflicts and so prevent the perpetuation of the disorder into the secondary stage. In "secondary" stuttering (11–19 years) treatment consists in a more direct approach, the aim being reorganization of the patient's personality, which admittedly is a tedious and difficult undertaking.

The exact causation of stammering or stuttering remains an unsolved problem. It is practically certain that no single factor but several in combination are concerned in the aetiology of the disorder. Psychogenic symptoms are only too frequent, but most of these may well be secondary to the primary stammer. Few cases, in my experience, are relieved of their stammer by psychotherapeutic, or even psycho-analytical, methods alone. Nevertheless, Dr. Barbara's work is well worthy of study by those interested in the problem of stammering (or stuttering), as he writes from a basis of considerable experience and a wide knowledge of the literature of the subject.

C. WORSTER-DROUGHT.

ELECTROCARDIOGRAPHY AND VECTORCARDIOGRAPHY

Fundamentals of Electrocardiography and Vectorcardiography. By Lawrence E. Lamb, M.D. (Pp. 142+xiii; illustrated. 72s.) Springfield, Illinois: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1957.

The subtitle of this book, "Three-dimensional Quantitative Spatial Vectorcardiography," certainly sounds rather formidable. But this is not really the case. If anyone wants to have a knowledge of electrocardiography that is not merely descriptive, this is the sort of book to read. The subject will then be approached from the angle of interpretation, which should result in full understanding. There is nothing really abstruse in vectorcardiography, and to translate the ordinary electrocardiogram into these curves is not really difficult—a further step leading to consideration in three dimensions instead of two is not insuperable. There are certain mathematical aspects, but it is not really essential to master these. This book sets forth the subject very clearly. There are many excellent diagrams. At the end there are chapters on the arrhythmias and also on drugs and cardiac metabolism. Throughout there is laudable economy of expression, but this does not obscure the thought; rather the reverse—it adds to the clearness. This book can be fully recommended for study; it is one of the best I have met with so far.

TERENCE EAST.

The fourth edition of Professor E. J. Conway's manual on *Microdiffusion Analysis and Volumetric Error* (Crosby Lockwood, 1957; 465 pages, 42s.) incorporates descriptions of several recent advances in technique, including the use of the blood ammonium method in the study of liver disease and the method of Weil-Malherbe and Green for total nitrogen determination in brain slices, and an account of some new developments in apparatus.

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SURGERY FOR DEAFNESS

For the perception of sound an intact end-organ and central connexions are necessary, and also an unobstructed conduction pathway. In addition, the sound waves must be received at the oval and round windows with a suitable phase difference. This is normally provided by the chain of ossicles in the middle ear transferring sound vibrations from the drum membrane to the foot-plate of the stapes and thence to the oval window, while at the same time these vibrations are conducted directly through the air space of the middle ear to the round window. Movements of the oval window are transferred to the incompressible fluid occupying the inner ear and are reflected in movements of the round window in the opposite phase. Motion thus imparted to the fluid of the inner ear stimulates the organ of Corti, the end-organ of perception. But these movements depend on there being a sufficient phase difference at the oval and round windows.

Transference of sound waves through the middle ear is affected by, firstly, lesions of the drum membrane and of the middle ear impairing the integrity of the ossicular chain or restricting its mobility by adhesions; secondly, scar tissue in the round window niche or at the foot-plate of the stapes; thirdly, fixation of the stapes foot-plate by bony ankylosis. Lesions in the first group are usually the result of suppuration, and the possible methods of treatment have been discussed.[1] Lesions in the second group may result from inflammation, or may be due to the organization of residual mesenchymal deposits, the so-called chronic adhesive process. The treatment will be considered with that of the third group.

The most common cause of fixation of the stapes foot-plate is otosclerosis, a condition in which new bone forms in the inner ear capsule, usually in the neighbourhood of the oval window, and perhaps because of an attempt at healing a persisting embryonic defect. This new bone gradually invades the margins of the oval window and restricts the free movement of the stapes. In time the annular ligament attaching the foot-plate to the bony wall of the window becomes infiltrated with bone, which ultimately spreads into the foot-plate itself. These changes cause increasing deafness. The process is sometimes rapid, almost fulminating, but more often it takes years; it may be arrested at any stage and never produce complete bony ankylosis. This pathological process, although not the reason for it, has been well known for many years, and the theoretical possibilities of treatment have also been formulated and to some extent practised for years, but it is only within the past two decades that surgical treatment has become safe and the results reasonably predictable.

Six years ago Samuel Rosen, of New York, published his first series of cases treated by mobilization of the stapes foot-plate, and he has recently summarized for a British audience the progress during the intervening period.[2,3] The method is essentially simple, and it seems almost absurd that success has taken so long in achievement. The use of magnification, scrupulous technique, and antibiotics all play their part, especially the first two. After local analgesia the drum membrane is reflected from its posterior attachment and the incudo-stapedial joint is exposed. It is often necessary to remove some bone from the postero-superior portion of the tympanic ring to obtain a good exposure of this joint and of the stapes foot-plate and round window which are the next essential anatomical landmarks. All this area is carefully inspected under high magnification. In cases of chronic adhesive deafness, the constricting adhesions are divided or dissected away. In otosclerosis, by Rosen's original method, an instrument is placed on the neck of the stapes and with light and controlled pressure the bone is rocked and the foot-plate is wholly or partially fractured out of its bony confinement. This procedure is unsuccessful in a number of cases because the ankylosis is too dense and the slender crura of the stapes give way before the ankylosing bone. When this appears likely the foot-plate is directly approached and attempts made to pry it loose. Even this may fail, and Rosen then resorts to making an opening in the foot-plate itself.[4] The drum membrane is replaced at the end of the operation. By these simple but delicate manœuvres hearing can be improved, and sometimes restored nearly to normal, in many cases of otosclerosis. Provided the organ of perception is functioning normally or reasonably well, good results can be expected in over 50% of cases, and this proportion increases as the operator's skill improves.[5] There

[1] *Brit. med. J.*, 1957, **2**, 90.
[2] Rosen, S., *Arch. Otolaryng.* (*Chicago*), 1952, **56**, 610.
[3] —— *J. Laryng.*, 1958, **72**, 263.
[4] —— *Arch. Otolaryng.* (*Chicago*), 1956, **64**, 227.
[5] Goodhill, V., and Holcomb, A. L., *Laryngoscope* (*St. Louis*), 1957, **67**, 615.
[6] Lempert, J., *Arch. Otolaryng.* (*Chicago*), 1938, **28**, 42.

are certain possible operative accidents, but they should be few and of little account. There are almost no contraindications, once the case has been selected, and the patient is only off work, or out of circulation, for a few days.

It is now exactly twenty years since Julius Lempert, of New York, published his first series of cases treated by fenestration.[6] The idea of making a bypass opening somewhere in the capsule of the inner ear to act in concert with the round window is very old, and many attempts at it were made in past years. However, Lempert's technique was the first successful one. It too requires scrupulous care. A new opening (fenestra) is made in the external semicircular canal. This opening is covered with a flap of skin from the external meatus continuous with the drum membrane, and lies exposed to the outside world in a cavity similar to the cavity of a modified radical mastoidectomy. The drum membrane adheres to the inner wall of the middle ear above the round window, which is thus enclosed in an air-containing space continuous with the Eustachian tube. This arrangement ensures that sound waves arrive at the fenestra and the round window in a different phase, so that they can be propagated through the labyrinthine and cochlear fluids. These conditions are essential for a successful result. In the performance of the operation the incus and the head of the malleus are sacrificed, resulting in an inevitable loss of hearing, between twenty to twenty-five decibels by calculation and confirmed by observation. Thus the hearing can never be restored to normal by a fenestration, however successful, whereas stapedolysis can in theory result in normal hearing, and in practice some cases come very close to it. Nevertheless, the perfecting of the technique of fenestration during the twenty years of its enthusiastic performance all over the world has led to considerable certainty in the result to be expected in any given case, and to a high percentage of successful cases.

Fortunately, Rosen's and Lempert's procedures are complementary. If the direct attack on the stapes is unsuccessful, the indirect one, a fenestration, is neither invalidated nor prejudiced, and the operation can be performed as soon as the meatal wall is soundly healed. It is now usual to advise stapes mobilization as a first procedure, and fenestration if it fails. Surgery therefore has much to offer in deafness due to otosclerosis, and increasing experience is showing that some cases of chronic adhesive deafness can also be improved. These advances, together with similar advances in the surgical treatment of cases of suppuration, and the rapid improvement in construction of hearing-aids, are opening many new doors to the deaf patient.

HYPNO-ANAESTHESIA

Five thousand years ago man knew a great deal about influencing the psyche for the benefit of the sick or stricken soma. To our Western culture at least this knowledge has been largely lost. Perhaps the current waxing of interest in hypnosis marks the onset of a systematic effort to regain it.

Over the ages every type of operative procedure, major and minor, has been carried out under hypno-anaesthesia alone. In the last century Elliotson[1] and Esdaile[2] each wrote accounts of such work. Induction of hypnosis and the termination of the state are as smooth as falling into and awakening from natural sleep. While under hypnosis a patient may be made insensitive to pain from any defined area and also be made incapable of any given movement or of altering any desired posture.[3] Indeed, he can be enabled to maintain any desired posture indefinitely and without conscious effort, strain, or fatigue. Post-hypnotic suggestion will permit a suggestion given to the hypnotized patient to become effective immediately and remain effective after the hypnotic state has been terminated, or to become effective at some chosen moment in the future. During operation the patient may be kept conscious and fully co-operative, or placed in a state akin to normal sleep in which he is oblivious to his surroundings. All these phenomena can be made to cease in a moment and normal consciousness to be regained by appropriate counter-suggestions from the therapist. During and after operation there will be no complications directly attributable to the anaesthetic.

From this it would seem that hypnosis is the ideal anaesthetic for most kinds of surgery, and the question which at once arises is why it is not more widely used. The answer is that, though the mechanical aspects of the techniques for inducing hypnosis are easy to learn, successful induction largely depends on the interaction of factors in the personality of the patient which are but little understood with factors within the hypnotist which are not understood at all; and few therapists could guarantee to produce surgical hypno-anaesthesia in one in a hundred unselected surgical cases. Further, even the most favourable case might require three or four hours' work on different occasions before it was felt justifiable to operate. There is no quick and certain test to indicate the promising subject.

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[2] Esdaile, J., *Mesmerism in India and Its Practical Application in Surgery and Medicine*, 1851, Hartford.
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[6] Abramson, M., and Heron, W. T., ibid., 1950, **59**, 1069.
[7] Kelsey, D., and Barron, J. N., *Brit. med. J.*, 1958, **1**, 756.

Perhaps the chief indication for hypno-anaesthesia is in obstetrics.[4–6] Expectant mothers are apt to be good hypnotic subjects, and weekly training throughout pregnancy at the antenatal clinic would enable many labours to be completed without additional anaesthetics. This would mean that the mother would be fully conscious as she gave birth to her baby, to their great mutual benefit. It would also ensure that birth was as easy as possible for the baby, and in particular it would minimize the risk of the baby losing consciousness during the process of birth. Some workers believe that this is of importance for the future psychological development of the child. D. Kelsey and J. N. Barron[7] recently used hypnotically induced catatonia as the sole means of keeping a patient in a hand-to-foot posture for 28 days for purposes of plastic surgery. This application might possibly be extended to some orthopaedic work.

The same authors suggest that hypnosis would be advantageous for patients with severe burns who require a daily anaesthetic for their dressings and for whom every meal missed adds to the difficulty of maintaining the level of plasma proteins. Dentists[3] have found hypno-anaesthesia of value in the treatment of both adults and children. Once analgesia has thus been successfully induced in the mouth, the patient can have it reinduced, or be trained to reinduce it himself, at will for the rest of his life. Some success has also been achieved in keeping the acute pain of earache, toothache, and some injuries at bay until adequate treatment could be instituted, and also in controlling the pain of inoperable malignant disease.

Though hypnosis is out of the question as a routine general anaesthetic, its advantages might be brought to many more surgical patients than at present if special hypnosis clinics were set up, experimentally at first, in the larger hospitals. Patients awaiting a non-urgent operation would be invited to attend the clinic on several occasions prior to admission. The clinic would work largely with groups, and the main aim would be to allay pre-operative anxiety and, by the use of post-hypnotic suggestion, forestall post-operative symptoms and complications. If a patient suffered no pain from his wound, for example, he would breathe and cough freely, thereby eliminating what is usually held to be the greatest single cause of post-operative chest disease. Sleep and appetite could be improved and appropriate individual suggestions could greatly assist the work of physiotherapists. In brief, convalescence and rehabilitation could be made smoother and speedier for many of the patients attending the clinic.

EARLY CARCINOMA OF STOMACH

The occurrence of early carcinomatous lesions in the stomach has aroused considerable interest during the last few years, and a case recently described by J. J. Bocian and A. E. Geschke[1] is regarded as a true example of carcinoma in situ. These authors are at pains to distinguish carcinoma in situ of non-polypoid form from superficial spreading carcinoma of the stomach. Both types of growth may replace the normal glandular tissue of the mucous membrane over a considerable area.

Carcinoma in situ occurs in the stomach in two forms, polypoid and non-polypoid. Polyps showing malignant appearances in some cells are occasionally found in the stomach, analogous with similar polyps occurring in the rectum, and in both sites they are apt to become malignant at a later date. From the edges of such a polyp, non-polypoid carcinoma in situ may spread along the gastric mucosa. In the non-polypoid form, which tends to occur in the pre-pyloric region, the abnormal cells of malignant appearance are confined within the basement membranes of the glands. These cells are atypical in form and arrangement; their nuclei are hyperchromatic and mitoses are frequent. A bizarre glandular pattern is produced which does not necessarily involve the deeper portions of the glands. The lesion may not be continuous, and necrosis and ulceration of its surface may be found.

T. B. Mallory[2] has reported seven cases of carcinoma in situ of the stomach, three of polypoid and four of non-polypoid form. In this small group there was no evidence of recurrence or of metastases in the intervals from one to seven years after resection of the stomach.

The superficial spreading carcinoma of the stomach, especially prone to occur in the pyloric antrum and often at the margin of a simple peptic ulcer, may spread for a considerable distance in the mucosa, invading the tissue spaces and lymphatics and not remaining confined within the basement membranes of the glands. In some cases a dedifferentiation of varying degree has taken place, with the result that a varied picture is produced, and in whole or in part the lesion may assume the appearance of a small spheroidal-cell carcinoma. Intervening areas of mucosa not invaded by the growth, and perhaps showing intestinal metaplasia, may be present. A superficial or deep ulceration of the malignant tissue may be found. A. P. Stout described fifteen cases of this condition. In nine the growth started at the margin of a simple peptic ulcer and in five the growth itself was ulcerated. There was invasion of the muscularis, minimal in extent, in five cases only, but in seven metastases were found in the superior or inferior gastric glands. Other authors have described cases in which small but definitely larger foci of invasion beyond the muscularis mucosae were found at intervals. All Stout's fifteen

[1] Bocian, J. J., and Geschke, A. E., *Arch. Path.* (*Chicago*), 1958, **65**, 6.
[2] Mallory, T. B., ibid., 1940, **30**, 348.
Stout, A. P., *Arch. Surg.* (*Chicago*), 1942, **44**, 651.
[4] Graham, R. M., Ulfelder, H., and Green, T. H., *Surg. Gynec. Obstet.*, 1948, **86**, 257.
[5] Schade, R. O. K., *Brit. med. J.*, 1958, **1**, 743.

cases survived operation. One died of cancer 13 months after resection of stomach; of the remainder, four had survived for 3 years when his paper appeared, three between 2 and 3 years, three between 1 and 2 years, and three for less than a year. The prognosis in this type also would appear to be somewhat better than that obtaining in the average case of gastric carcinoma.

The distinction between carcinoma in situ, as defined above, and superficial spreading carcinoma of the stomach, rests therefore on a histological basis. In the absence of invasion of the muscularis mucosae some authors would place both lesions in the same category, though this is not strictly accurate. It would appear probable, however, that the former lesion may pass imperceptibly into the latter; but, as in cases of carcinoma in situ occurring elsewhere—for example, in the cervix uteri—a variable period, perhaps many years, may elapse.

In the detection of these early changes certain precautions have to be taken in the macroscopic examination of the resected stomach. It should be examined in the unfixed condition as soon as possible after removal. In some specimens there may be a reddish-brown discoloration or a slight puckering of the mucous membrane; in others, especially in cases of carcinoma in situ, nothing may be seen, the abnormal condition being discovered accidentally in the histological examination and perhaps starting at the margin of a gastric ulcer. A more extensive investigation of the stomach wall in the neighbourhood of gastric ulcers might reveal more of these cases—though they appear to be rare.

The more favourable results of operation reported in such cases indicate that early diagnosis is obviously desirable, but it is often a difficult matter and may be impossible. The clinical symptoms may be confused owing to the frequent association with gastric ulcer. *X*-ray examination may sometimes reveal a change in outline of the wall of the stomach and some interference with peristalsis. The use of the gastroscope and gastric biopsy may sometimes be successful. Of recent years cytological examination of the gastric mucosa has been practised and a variety of methods employed. Considerable experience is called for, but some workers—R. M. Graham[4] and her colleagues, and R. O. K. Schade[5]—have succeeded in making early diagnoses.

MORE DEATHS FROM FOG

It is known that some increase in mortality accompanied a succession of severe fogs at the end of the nineteenth century, and there were occasional reports of similar occurrences during the first half of this century.[1] But it is only since 1949 that much notice has been taken of the great increase in the number of deaths that severe fog, especially in London, brings in its train.[2] Now once more evidence has been presented of the toll taken of life. W. H. Bradley, W. P. D. Logan, and A. E. Martin[3] have discussed the effect of the fog of December 2 to 5, 1957, on the Greater London area and J. A. Scott[4] of its effect on the County of London. While it is impossible (and unnecessary) to be certain of the exact number of deaths attributable to the fog, there appears to have been an excess of between 800 and 1,000 deaths in Greater London, 400 of which occurred in the county council area (included in these figures are the 87 deaths of the Lewisham rail disaster). A. T. Gore and C. W. Shaddick[5] suggest that there is a threshold level of four times the customary winter average of atmospheric pollution above which there will be an immediate increase in mortality. It is too early yet to say whether this hypothesis is generally true or whether a threshold value exists at all, but it is becoming increasingly clear that the rise in mortality occurs very early in the foggy period, and Bradley and his co-authors note that in the most recent episode it occurred before the atmospheric pollution had reached its maximum. Another point of interest is that deaths occurred among a younger group of persons than was the case with the fog of January, 1956,[6] and Scott suggests that investigation would be worth while into the possibility of this having been related to the higher sulphur-dioxide content of the 1957 fog. Fogs undoubtedly cause sharp peaks in the mortality curve, but it is worth remembering that in the long run "normal" air pollution causes the greater loss of life. The Clean Air Act, 1956, will have the effect of reducing smoke and will probably thereby reduce mortality, but much remains to be done, not only in the study of the effect of air pollution on man and animals, but on the prevention of the pollution itself.

DEATH FROM OBSCURE CAUSES IN INFANCY

Though about 200 deaths of infants have been annually ascribed to accidental mechanical suffocation in England and Wales in recent years, many doctors have come to doubt whether the diagnosis is often valid. W. A. Brend[7] was one of the first to study this question and to cast doubt on "overlying" by the mother as the frequent cause of death by suffocation it was then supposed to be. He commented, as others have done since, on the lack of adequate necropsy data. W. H. Davison[8] made good this deficiency by carrying out post-mortem examinations in 1938–44 on 318 infants in Birmingham whose deaths were suspected to have been caused, at least in part, by asphyxia. Of these only 38 were found to have been so caused, and only 24 of them were ascribed to mechanical suffocation; the rest were ascribed to infections, mainly bronchopneumonia. Other investigators have confirmed the high incidence of infection as a cause of the deaths at first thought to be asphyxial, and many would agree with the comment made recently in our medico-legal columns[9] that "a

[1] Ministry of Health, Reports on Public Health and Medical Subjects No. 95, 1954, H.M.S.O., London.
[2] Logan, W. P. D., *Lancet*, 1949, **1**, 78.
[3] Bradley, W. H., Logan, W. P. D., and Martin, A. E., *Mon. Bull. Min. Hlth*, 1958, **17**, 156.
[4] Scott, J. A., *Med. Offr*, 1958, **99**, 367.
[5] Gore, A. T., and Shaddick, C. W., *Brit. J. prev. soc. Med.*, 1958, **12**, 104.
[6] Logan, W. P. D., *Brit. med. J.*, 1956, **1**, 722.
[7] Brend, W. A., *An Inquiry into the Statistics of Deaths from Violence and Natural Causes in the United Kingdom*, 1915, London.
[8] Davison, W. H., *Brit. med. J.*, 1945, **2**, 251.
[9] Ibid., 1958, **2**, 111.
[10] Banks, A. L., *Mon. Bull. Min. Hlth Lab. Serv.*, 1958, **17**, 182.

diagnosis of accidental suffocation should not now be made unless there is an obvious mechanical cause for it."

In order to investigate these problems further a steering committee with Professor A. L. Banks, of Cambridge, as chairman was set up under the aegis of the Ministry of Health in 1953. Since then the members of this team have been carrying out necropsy studies on babies who died a sudden death between the ages of 2 weeks and 2 years in certain of the London boroughs and in the city of Cambridge and parts of the county. An interim report now presented[10] shows the results in 64 London cases and 17 Cambridge cases. Of the 52 London cases examined histologically, 38 (73%) were found to have died of tracheobronchitis, 11 (21%) of bronchitis or bronchopneumonia, and the remaining 3 (6%) of septicaemia and gastro-enteritis. Of the 17 Cambridge cases 3 died of pneumonia (in the broad sense) and 1 of meningococcal septicaemia. In 13 cases the cause of death remained uncertain, but six of these showed inflammatory changes in the respiratory tract. Analysis of these deaths by the months in which they occurred showed them to be three times as prevalent in winter as in summer, while the proportion of males to females was 1.9 to 1. Both these statistical features are to be expected in deaths of babies from respiratory infection.

The investigation has now reached a point where the evidence so far gathered points to the need for more thorough virological study. Consequently the steering committee has formed a subcommittee under the chairmanship of Sir Samuel Bedson to pursue the viruses, and a full-time virus research worker is soon to be appointed. It is an important study and bids fair to unravel once and for all the exact causes of death in a type of case that is apt to be obscure to the doctor and particularly distressing to the parents.

TEENAGE SWIMMERS

At the recent Empire Games in Cardiff girls of from 14 to 19 years of age broke the world's records for the women's medley 4×110 yards relay swimming race and the women's 110 yards backstroke race. Why are such young girls capable of breaking swimming records presumably before at least some of them have developed their full physical strength? It has long been recognized that the peak age for best performances varies in different sports.[1] In the swimming events this seems consistently to be in the teens, especially so far as the women competitors are concerned. Are there any physiological factors to account for this or is it simply a training effect? The English girls in the successful relay team at Cardiff all trained for between 2 and 3½ hours a day and, with one exception, worked at school for the normal hours. The young Australian swimmers, whose success was also notable, trained for about the same daily period. All divided the training into early morning and evening sessions. Most used the popular "controlled interval" method. This means that if the distance to be swum was one mile or 1,500 metres they divided the distance into 15×100 yards and swam each 100 yards at, say nine-tenths of their maximum speed, with a rest of about 10 seconds in between each 100 yards. The Australian swimmer Konrads would, for instance, swim 30×50 metres sprints at 32 seconds (his fastest time being about 27 seconds) with a 3-second rest between each sprint. This training technique is remarkable in its close resemblance to the "consecutive" quarter-miles run by Dr. Roger Bannister in his preparation for running the first under-four-minute mile.[2] But, apart from training, these girls also have inherent constitutional advantages in that they are of suitable somatotype for swimming. The combination of fat (endomorphy) for buoyancy and muscle (mesomorphy) for power and aggressiveness helps many young swimmers to achieve success. I. J. MacQueen[3] has recently discussed the importance of somatotype in selection and training for sport. As puberty develops, the teenagers lose their puppy fat, develop more mature figures—and sink, or, at least, do not swim so fast. It has also been suggested that the younger of these girls have none of the worries of life (particularly boy friends) which may disturb the equanimity so essential to the expert swimmer.

[1] See annotation in *Brit. med. J.*, 1957, **2**, 874.
[2] Bannister, R., *The First Four Minutes*, 1955, London.
[3] In a lecture to the British Association of Sport and Medicine, University College Hospital, London, 1957.

"THE MEDICAL OFFICER"

For fifty years *The Medical Officer* has brought up-to-the-minute information to those who work in the public health service. This independent weekly periodical was founded by the late Sir George Elliston in 1908, and its golden jubilee number, dated September 5, 1958, has a commemorative article by Sir Allen Daley, who writes with respect and affection about the founder of the journal. Besides discussing the past Sir Allen also has some trenchant things to say about the future of the public health service. "The present position is," he writes, "that if local authorities are not prepared to pay the market price for good doctors they won't get them; preventive work will have to be tagged on to curative work, and the British public health service which has pioneered the world will die." Mr. Lewis Elliston, the present editor of *The Medical Officer* and eldest son of the founder, has taken the opportunity to recount the story of British public health as told in the pages of his journal from 1908 to 1958. The earlier part of this period was, as Sir Allen Daley says, the golden age of public health, but preventive medicine has still far to go, and public health workers may be confident that a journal which has served them so well in the past will successfully meet the changing needs of the future.

We record with regret the death on September 5 of Lieutenant-General Sir Bennett Hance, Director-General of the Indian Medical Service from 1943 to 1946.

WORLD FEDERATION FOR MENTAL HEALTH

ANNUAL MEETING IN VIENNA, AUGUST 24–29

[FROM A SPECIAL CORRESPONDENT]

For the second time in its ten years' life the World Federation for Mental Health held its annual meeting in this lovely city, at the invitation of its Austrian member society and under the patronage of the President of the Federal Republic. Dr. BROCK CHISHOLM, the retiring president of W.F.M.H., shared chairmanship with Professor HANS HOFF, who was later installed as president for the ensuing year, with Dr. PAUL SIVADON (France) as vice-president.

"Uprooting and Resettlement"

The growing stature of W.F.M.H. in the world was indicated by there being a special conference, within the meeting, of officials of governments, who shared in private sessions the main congress theme, "Uprooting and Resettlement," but who also collaborated with the informal non-governmental membership. The topic was peculiarly appropriate to the Austrian and Viennese scene. Ministers of the Republic and civic dignitaries who spoke at the opening session imparted realism and urgency to the proceedings. Austrians can be very proud of the part they have played over the centuries as the recipients and second home for great waves of migrants. The size of the problem was emphasized by the figure of 1.5 million of uprooted persons received and "processed" by Austria alone since 1945, including 180,000 Hungarians since 1956.

The annual meetings of W.F.M.H. are essentially devoted to the exchange of experience and method between practical workers—doctors, nurses, social workers, and social scientists. The meeting proceeds by discussion groups fed by a small number of "Keynote" addresses. Of these, Dr. BROCK CHISHOLM'S sounded a sombre note of challenge. Humanity's chance of survival depended entirely on our capacity to stay the hands of those who are still playing with the destructive, suicidal fire of nuclear armaments—the ultimate insanity and mental health problem, especially in the light of recent scientific reports on the long-term effects of radiation on genetic mutation. This responsibility for our generation was unprecedented, since we were the first human generation to have both the secrets of nuclear power and the knowledge and insight of modern behavioural science into factors making for the warping of human personality. Our children and succeeding generations would judge us by the way in which we could at least initiate the difficult, untried task of changing attitudes from partial, antiquated systems of values, loyalties, and prejudices to an overriding responsibility for humanity itself. Dr. Chisholm instanced this by his own experience of parents who had preferred to let their own child die rather than let it be admitted to a hospital open to them but run by a hated rival religious body. Great nations squandered untold wealth on "raising dust on the moon" while 600 million out of 900 million children were inadequately fed, clothed, or housed. The way children were either coerced into the parental mould or allowed freely to outgrow their parents' narrower values seemed to Dr. Chisholm one of the keys to lessening unconscious hate and rebellion against life and all that this implied by way of defensive or antisocial behaviour.

Refugee and Host

Dr. MARIA PFISTER, of the mental health section of W.H.O. and an authority on refugee and D.P. problems, gave a most valuable paper on the interaction of refugee and host. The central theme was again the overwhelming importance of the clash between cultural values. The deep need to preserve identity (whether by individual or group) could lead to defensive regression. The group might become statically inturned and uncooperative, while the at first well-meaning host community, perplexed by this unrecognized primitive defence mechanism, might lose its good will. Similarly, the individual D.P. might soon project his fear and hate of the original persecutors on to his new, innocent hosts. The need, then, was for insight into the strength and depth of "tribal" culture patterns of both parties. In practice it called for skilled teams of catalytic liaison figures representing both host and migrant groups. Dr. Pfister's lecture gave a reassuring demonstration of the advances of socio-psychological knowledge in this field, though its application to the therapeutic task involved in large-scale resettlement, even of the voluntary migrant, remains difficult.

This point was elaborated in greater detail by Mr. ELFAN REES, of the World Council of Churches. We began to see the working of uniform mechanisms behind the variety of psychological and social behaviour symptoms in various refugee populations. The epidemic of refugees was likely to be with us for many years. As some were resettled, other waves broke. Thus, last year a million fresh refugees were added, mainly from Hungary, Yugoslavia, and Algiers. Mr. Rees confirmed that the difficulty of resettlement depended on the degree of cultural difference. He emphasized the explosive dynamic nature of refugee groups—a sort of third force of the "dispossessed," prone to rumour, propaganda, and irredentist revenge dreams, ever rejecting the possible and demanding the impossible. In some very poor countries the status of refugee was eagerly sought after: U.N. help made this the one certain free-meal ticket.

Psychology of the Migrant

The problem of the migrant's identity and self-esteem was closely linked to the general psychology of development and regression by Mr. ERIK H. ERIKSON, the American psycho-analyst. He showed by clinical examples the overlap between the unconscious motivations of the voluntary migrant, the more "real" persecution fears of the forced refugee and the prodigal son—the adolescent rebel and "angry young man." In this talk entitled "Identity in our Time," Mr. Erikson argued that the sense of being powerless drove all these categories of the dispossessed (whether by real or by fantasy agency) into mastery of their loneliness by fierce self-assertion or denial of dependence. Normally and in health a person's identity is echoed by the community's conferment of role and status. This orderly process the "outsider" missed. Thus he compensated by inner anger and even a paranoid feeling of omnipotence.

From this part of the programme there emerged a surprisingly clear statement of the malaise of our era: the millions of human beings without settled roots or status who *could* become the new world citizens with a less particularist self-perception, but who in practice behave singly or collectively like deprived children. Here indeed is a challenge to the disciplines concerned with mental health. Dr. H. STROTZKA (Vienna) modestly related his experience at the head of a multi-professional mental health team which took up this challenge during the acute Hungarian refugee crisis on the Austrian border.* This was a practical and deliberately oriented piece of action research, perhaps the first in history to apply preventive psychiatry to a mass phenomenon during peace-time. In the teeth of the usual opposition to psychiatry by the "common-sense" folk, the team succeeded in isolating and helping the more overt casualties, in being given access to obvious mental health crises, in establishing some selection and training in elementary human relations for camp staff and key figures, and in making useful observations.

The last day of the conference was devoted to reports and evaluation of the work of the numerous discussion groups, and to an address by Professor HANS HOFF on "Home and Identity." A concluding banquet marked the tenth anniversary of the World Federation. Dr. J. R. REES, the Federation's indefatigable director, reported on progress over the

*Details can be read in H. Hoff and H. Strotzka's *Die psychohygienische Betreuung ungarischer Neuflücht-linge in Österreich, 1956–1958*. Hollinek, Vienna, 1958.

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decennium. From 22 affiliated societies the membership had risen to 113 member associations representing a large part of the civilized world. The Federation had been consulted increasingly as the accredited body on a wide variety of topics by numerous U.N. agencies and other non-governmental international bodies. A Mental Health Year (analogous to the International Geophysical Year) was planned for 1960 calling for great efforts by member bodies and governments in all countries. Dr. Rees received an ovation by the assembled representatives of many national groups.

During the conference, Dr. H. V. DICKS (London) delivered the first Mary Hemingway Rees memorial lecture. This memorial was established by a trust to be devoted to biennial lectures on mental health and spiritual values. Dr. Dicks chose to speak on the striking resemblances between certain ancient Indian and Chinese thought and practice and some modern psycho-analytic concepts.

Vienna's traditional charm and hospitality added greatly to the benefits of an otherwise very serious meeting, of which only the highlights are briefly reported. There were some good mental health films and also visits to refugee camps and institutions.

Motoring News

SEAT COVERS

For the motorist who likes to improve the appearance of his car and yet make its interior last longer there can be few better buys than a set of seat covers. We all know how luxurious even a cheap car can look if it has some attractive seat covers, and for an outlay of about £7 this can be very simply achieved. Seat covers perform several functions in that they protect the original unholstery, be it real leather or cheap leathercloth, from the ravages of dogs, young children, or untidy owners. They protect the suits of professional men from the shininess caused by rubbing against leather or plastic. They also stop dirt and stains from going into the upholstery, which is not so easily cleaned as detachable covers. Slippery seats also can often be cured by the fitting of good fabric covers, thus adding to the comfort of passengers on a long journey. Loose covers therefore have a definite value in keeping up the second-hand value of the car by protecting the upholstery.

There are so many different materials on the market today that it is not easy to choose the most suitable. Woven materials are generally best, though felt is perhaps the least expensive and will wash well without losing its shape. Rayon is suitable for very hard wear and where there is much dirt; it is an excellent material for those who must transport dogs in the car, for it can be wiped clean with a damp cloth. It is cold to the touch, however, and is not ideal for winter use. Natural fabrics such as the varieties of Bedford cord and pure wool give hard wear and warmth, and the same applies to the various imitation furs such as leopard and zebra. A less expensive material is cotton duck, which, though it is not thick, is warm in winter and cool in summer. In recent months transparent plastic has come into fashion, particularly on coupés and open cars, so as to show the original pattern of the upholstery and yet render it showerproof. While being reasonably hard-wearing, these plastics do not "breathe" like a normal cloth, and they are therefore uncomfortable in hot weather.

Touring Spares

If you are among the happy minority of motorists who have not yet embarked on a summer holiday, you may still be sorting out your baggage and prowling round your garage for useful items to add to the tool kit of your car in case of emergencies. The average tool roll provided with a new car, if it is a popular model in the low or medium price range, is usually inadequate for any but the simplest of repairs. One item in particular which is often omitted from such an outfit is a spanner for adjusting the small nuts holding the contact-breaker points. A 2BA electrical spanner is therefore desirable as being the most useful, but a set including 2, 3, 4, and 5BA can be obtained cheaply and will cover all requirements. A small screwdriver with an insulated plastic handle and a large roll of insulating tape, wrapped to prevent oil from destroying its adhesive properties, should also be carried. Likewise a length of heavy-duty electric cable with some crocodile clips can be useful for temporary repairs where the wiring has failed in some inaccessible spot.

Spare fuses or fuse-wire, contact-breaker points, and spare parts for the water pump, if fitted, can often prevent hours of delay at some wayside garage should the correct pattern of parts be unobtainable. A tyre pressure gauge and a grease gun should, of course, be in the tool kit already, as well as a plug spanner. One item which is often omitted from a seemingly comprehensive tool kit is a powerful chrome-vanadium ring spanner for cylinder head nuts. If you have to change a gasket the usual cheap black spanner will not shift a nut done up to 45 lb./ft. or more. Mechanical spares such as fan belts, a spare plug, condenser, and a cylinder-head gasket should always be carried, and, if you want to be really independent, a half shaft and a coil should see you through any emergency. When carrying gaskets, however, remember to see that they are carefully stored in a position where they will not be damaged.

Yellow Lights

Within the past few years more and more British motorists have come to appreciate the advantages of yellow lights. Those who have driven in France, where yellow headlamps are compulsory, may have noted the advantage of lack of dazzle which yellow bulbs offer. There is very little difficulty in obtaining coloured bulbs to suit any normal British-made car, especially those of recent manufacture.

They cost slightly more than the white ones, but their light is much softer on the eyes both for the driver of the car to which they are fitted and for the drivers of oncoming cars. They are also better for use in fog and for town driving on dipped beams, as there is less dazzle from shop windows and other reflecting surfaces. The French Government found that it was easier to specify yellow bulbs for all vehicles than to go to the trouble of testing the headlamps of individual vehicles, and the system seems to be satisfactory.

The only road users who might find cause to complain are the owners of fast sports cars, for whom yellow lamps mean a shorter beam and therefore a smaller margin of safety at high speeds. This could be overcome by using lenses for a long narrow beam and by fitting supplementary lamps for kerb illumination. The normal road user, however, would find the more restful yellow beams sufficiently penetrating for all types of night driving, while the dipped beam could be used on busy arterial roads without there being any question of offending oncoming traffic, as is often the case with present double-dipping white lights. In many other European countries motorists are following the French example, for dazzle is a well-known cause of road accidents, and anything which counteracts this is surely worthy of trial.

IAIN GELLATLY.

Neurochirurgia is published by Georg Thieme, Leipzig, as a supplement to *Fortschritte der Neurologie und Psychiatrie*. It contains articles in English, French, or German, in each case with a summary in the other two languages. For the present, two numbers of *Neurochirurgia* will appear each year at an annual subscription of DM. 18 (DM. 16.20 to subscribers to the *Fortschritte*).

To-day's Drugs

In this column we publish from time to time authoritative notes on a selection of drugs in current use.

Codelsol Skin Lotion with Neomycin (Merck Sharp and Dohme Ltd.)—1 ml. contains prednisolone 21-phosphate 5 mg. and neomycin sulphate 5 mg.

Neomycin is one of the most useful antibiotics for local application. It has a wide range of antibacterial activity and it is very unlikely to give rise to irritation or local sensitivity reactions. These qualities make it one of the most useful and valuable antibiotics for local application to the skin. Not surprisingly, preparations combining neomycin with hydrocortisone have been available for a few years and have proved of undoubted value. Codelsol is formulated along similar lines except that prednisolone is substituted for hydrocortisone, with which it has a closely comparable, if not identical, effect. There may be a few cases in which a better response can be obtained to prednisolone than to hydrocortisone, but in general the actions of these substances are similar.

Codelsol is recommended by the makers for use in adult and infantile eczema, contact dermatitis, neuro-dermatitis, otitis externa, intertrigo, and non-specific anogenital pruritus. It is a good axiom not to apply antiseptics and antibiotics to the skin in the absence of infection, and not all cases of the kinds listed will be due to or complicated by infection. It will no doubt be more satisfactory to limit the use of this preparation to inflammatory or allergic skin disorders in which infection plays a dominant role. The preparation is most unlikely to give rise to local irritation, and even when applied to large areas systemic effects will probably not arise.

N.H.S. basic price: 15 ml., 16s.

Triplopen-S (Glaxo Laboratories Ltd.).—Each single-dose vial of this preparation contains 500,000 units of sodium penicillin, which is rapidly absorbed to give a high concentration in the blood for a few hours, and 250,000 and 500,000 units respectively of procaine and benethamine penicillin, the absorption and excretion of which occupy about 1 and 3–4 days. A sustained though diminishing effect is thus exerted over the whole of this period. It also contains 0.5 g. of streptomycin, the effect of which would be exerted for only about 8 hours.

Apart from its streptomycin content, this preparation should serve admirably for the treatment of penicillin-sensitive infections in out-patients, to whom it is inconvenient to administer repeated injections. The advisability of including streptomycin, which in any case will act only at the beginning of the period covered by the penicillin, is questionable. If the infection is due to a penicillin-sensitive organism, penicillin alone will suffice; if the organism is penicillin-resistant, the streptomycin is unlikely to compensate for the inefficacy of the penicillin, particularly in view of the fact that it will have ceased to act long before another dose is due. There are strong objections to administering streptomycin without specific indications for it.

On the comparatively rare occasions when such a combination of antibiotics is indicated, they are best mixed in the proportions which seem to be called for in the individual case, and in forms which will give approximately equal durations of effect.

N.H.S. basic price: One-dose vial, 2s. 10d.

Antidol (Lewis Laboratories Ltd.).—Each foil-wrapped tablet contains 250 mg. of salicylamide-(2-ethoxyethyl)-ether, 200 mg. of phenacetin, and 50 mg. of caffeine. This is a further alternative to compound aspirin tablets *B.P.C.*, especially appropriate for patients sensitive to aspirin.

N.H.S. basic price: 100 tabs., 11s. 8½d.

Correspondence

Because of heavy pressure on our space, correspondents are asked to keep their letters short.

Decline of Pertussis

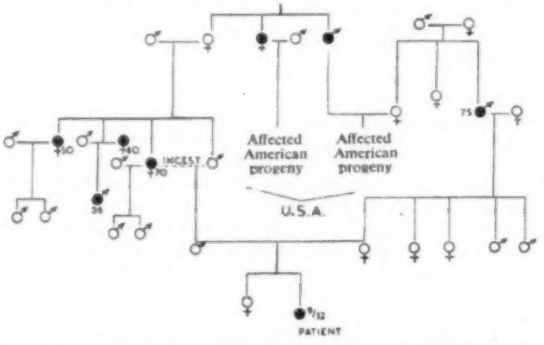
SIR,—Your excellent periodical graphs of infectious diseases, which compare the present incidence of a disease with the highest and the lowest weekly figures for the previous nine years, have recently shown a very significant change in the epidemiology of whooping-cough (pertussis). Whereas the current graphs of measles, scarlet-fever, poliomyelitis, and others have continued (apart from special epidemics) to run somewhere between the highest and lowest of the previous period, in the early summer of 1957 the graph of whooping-cough sank below that of the lowest previous figures, and has consistently run far below it ever since (see p. 697). Such a change points clearly to a new factor reducing the incidence of the disease, and the only new factor we know of is immunization.

I see that in early 1951, the first year in which you published the graphs, diphtheria showed the last phase of a similar decline, which had doubtless been going on for several years. And it will be most interesting to watch the poliomyelitis graphs, which may even now be starting to fall as the immunization campaign gathers way.—I am, etc.,

Oxford. A. D. GARDNER.

Diabetes Mellitus in Children

SIR,—I was extremely interested in the account of two cases of diabetes mellitus in children of a year old by Dr. D. W. Beaven (*Journal*, July 26, p. 198), and note that only 50 cases of diabetes developing in a child under the age of 12 months have been reported. I think the following case of diabetes manifesting in a child of 9 months is worth recording, not only because of the comparative rarity of



the disease occurring at such an early age but also to illustrate the extraordinarily strong hereditary influences, including a case of incest, which no doubt were responsible for the early manifestation in this case. All the affected persons in the family tree, which I give, are, or have been, patients of mine—except for the unspecified relatives in America. It was this knowledge of the family history that made the diagnosis in the infant's case less difficult than it might have been.

The infant, a female, was born on May 22, 1955, the delivery taking place at home and being quite normal. Birth weight was 8 lb. 2 oz. (3.6 kg.) and breast-feeding continued for six weeks and the child thrived normally. I was asked to visit her on February 17, 1956, as she was lethargic, not eating much, and crying a good deal. On arrival I found the child to be considerably dehydrated and was at a loss to account for this, as there had been no diarrhoea, she had vomited once only, and did not appear to have been sweating. Examination revealed no physical signs beyond those of dehydration, except for a slight blush of one eardrum.

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From the very first dose, 'V-Cil-K' brand penicillin V potassium provides intensive and rapidly decisive therapy. Effective levels are attained in 15 minutes and peak levels within 30 minutes—higher than those given by any other form of oral penicillin. The average dose is one 125 mg. tablet four times daily—a simple regimen that saves the physician's time and spares the patient discomfort of injection. 'V-Cil-K' is highly effective from the first dose and inexpensive to the last. The cost is the same as that of penicillin V. It is available as tablets of 60 mg., 125 mg. and 250 mg.

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and malnourished patients the basis of

putting on weight

in a safe and unobjectionable way . . .

and without drugs is to provide an attractive, readily assimilable dietary supplement of high calorie value. Wate-on does this by incorporating large amounts of a vegetable oil which is rich in readily assimilable, highly unsaturated fatty acids, and glucose which is the most easily assimilated type of carbohydrate. The physiological advantages of these two materials have been firmly established by medical research.

Wate-on is also rich in lecithin which, in addition to its basic calorie value, is also of high physiological value.

Wate-on is further supplemented by the more important vitamins and minerals.

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Each ounce of WATE-ON contains			
Corn (Maize) Oil	33.0%	Vitamin B_2 Riboflavin	1.0 mg.
Glucose	16.5%	Vitamin B-1	0.4 mg.
Lecithin	11.0%	Calcium Pantothenate	0.4 mg.
Iron (as ferrous gluconate)	3.2 mg.	Vitamin B-6	0.03 mg.
Nicotinamide	2.0 mg.	Vitamin D-2	100 I.U.
		Vitamin B-12	4.2 mc.g.

Wate-on is a homogenized fat emulsion, which means that it is in a very easily assimilable physical condition. To sum up, Wate-on is based on the latest results of medical research. Clinical trials have shown that with both ordinary and post-operative patients the regular ingestion of Wate-on was followed not only by gain in weight but also the general health was improved. No side effects were reported.

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17/6 per 16 oz. bottle

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Concluding that the child must have a slight infection, I prescribed benzathine penicillin and instructed the mother to push fluids in small amounts at frequent intervals. Forty-eight hours later the infant was as well as ever, happy and lively and feeding well. One week later, on February 24, I received another message to visit the infant. On arrival the symptoms were the same as on the previous occasion, except that this time the dehydration was more marked, she was very drowsy and was roused only with difficulty. It was at this difficult stage that I suddenly remembered the three great-aunts of the baby, all of whom had diabetes. I was fortunate in being able to obtain a specimen of urine almost immediately and found it to be loaded with sugar and acetone. The infant and her mother were admitted at once to the child health department of a teaching hospital. On admission the blood sugar was found to be 534 mg.%. The first-class co-operation of the department and the mother resulted in the child being stabilized over a period of eight weeks, and up to the present time she has remained in excellent health and thrived normally, largely due to the intelligent management of the mother through several minor infections.

The strong diabetic heredity in this case was no doubt the cause of such an early manifestation of the diabetic diathesis. I have indicated in the family tree the approximate age at which other members of the family developed diabetes; unfortunately there is no information available about the members of the family who developed the disease in America. This has occurred in an isolated country district where there is a great deal of intermarriage. On the credit side, however, is the relative absence of infection to which the infant is exposed as compared to a town child.—I am, etc.,

COUNTRY PRACTITIONER.

Infected Blood Transfusion

SIR,—Your report (*Journal*, August 2, p. 334) of infected blood causing death pinpoints the vital importance of pilot bottles. This tragedy would never have occurred if a pilot bottle had been supplied, as it seems almost certain that the blood had been contaminated by repeated tappings. This conclusion is irresistible. In the part of the country where I work pilot bottles are not supplied. It has been argued that pilot bottles are dangerous because they can be transposed (Campbell's holder[1] obviates this risk); that a film of the actual blood to be transfused should be examined to exclude bacteria contamination; and that tapping a pilot bottle does not give a true sample and so it is still necessary to tap the main bottle. But if organisms are present in the large bottle they will also be present in the pilot bottle. However, the danger of blood being contaminated at source is extremely remote.

Your correspondent seems surprised at the storm of criticism caused by the directive in the 1954 edition (omitted in the 1958 edition) of the Ministry of Health's booklet, *Notes on Transfusion*, that bottles that had been tapped, if not used within 24 hours, were to be labelled "Dangerous for Patients." The criticisms were not of this rule, with which most transfusionists concurred, but because some transfusion centres did not supply pilot bottles and have continued to refuse to do so. They also refuse to replace bottles that have been tapped and not used. If the Ministry's 1954 rule were observed many bottles would have to be discarded, as, inevitably, many bottles have to be tapped and are not used within 24 hours. The supply of blood is so short that this would mean denying blood to patients in desperate need. I believe most transfusionists, in those areas where pilot bottles were not supplied, disregarded the Ministry's directive. If all went well nothing was said; if disaster had ensued the transfusionist might well have been open to harsh criticism and perhaps legal action.

Your correspondent condemns small laboratories which serve as outposts to large group laboratories; he rightly believes this is one cause of transfusion disasters. Some years ago it was felt that the ideal was a large central laboratory with small branch laboratories. To-day the climate of opinion is swinging away from this, as it is being increasingly recognized that the big central laboratory, except for some highly specialized investigations, is extravagant in money and bad for the patient, clinician, and pathologist. It seems that the only advocates are office workers (both medically qualified and lay), who are out of touch with the problems of clinical medicine but who feel large central laboratories make for administrative tidiness, and perhaps those pathologists who hope themselves to become directors.—I am, etc.,

Worthing. R. AIDIN.

REFERENCE

[1] Campbell, J. S., *Lancet*, 1955, **1**, 1058.

Psychiatric Illness among Asian Students

SIR,—May I crave the hospitality of your columns to draw attention to the increasing incidence of psychoneurosis among Asian, especially Indian and Pakistani, post-graduates in London? The out-patient department of nearly every London teaching hospital has a fair number of these students. To understand their complaints a few remarks are necessary. During British rule only those Indians from well-to-do and well-educated families with traditions of English education used to be sent to this country by their parents. The vast majority are now sent here by their governments; some under the Colombo Plan and others with grants from American and Dominion Funds, and their educational standards are lower. Most of them who haunt surgeries and clinics have purely psychogenic symptoms, but unfortunately this is not often recognized until after considerable investigation. The main causes of their morbidity are:

(*a*) *Acute Anxiety.*—This is fairly common and the cause is almost always delay or non-receipt of their allowance from India. These patients need only mild sedation until they receive their allowance, when their symptoms vanish overnight.

(*b*) *Acute Depression.*—A few students who come from very sheltered homes where they were over-protected by their parents find themselves unable to paddle their own canoes. At first they cannot even understand what people say in this country, not having heard English as spoken by English people in their villages. They suffer from severe homesickness and depression characterized by, *inter alia*, auditory hallucinations. Some have wrongly accused their landladies and fellow lodgers of talking about them. They complain of hearing voices, nightmares, and loss of weight, and may be wrongly diagnosed as schizophrenics. As soon as the condition is recognized an attempt should be made to find out if there are any other students from the patient's district or who can speak his dialect (there are 150 languages and dialects in India), and, if there are, they should be asked to visit and cheer him up. If this does not succeed and his symptoms persist for three months or longer, he should be sent home. Once back at home, the symptoms disappear like magic without any treatment. Such acute depression is also met with in the case of some of the servants brought over to this country by Indian officials.

(*c*) *Chronic Anxiety.*—The vast majority who suffer from chronic anxiety wander from doctor to doctor, attend hospital after hospital and are subjected to numerous investigations. They form over 1% of the male admissions to this large neurosis centre. The chief cause of their troubles is their failure to cope with their studies and their inability to meet the requirements of English universities. Instead of admitting this, they conveniently seek refuge in psychoneurotic illness to explain their repeated failures to pass examinations. One has often heard, "But for my illness which the specialists could not cure I would have passed my exams very easily."

(*d*) *Hystero-malingerers.*—These make undesirable acquaintances, frequent cheap cafés and dance halls, and are too lazy to study their subjects. So long as they can produce evidence that that they have been attending surgeries or clinics they can prolong their stay and have a good time. They will accept anything a doctor offers them—E.C.T., group therapy, analysis, or anything else—and say it is doing them good, until the doctor is tired of them, when they go to another doctor.

(*e*) *Acute Schizophrenia.*—It is worth mentioning that, while psychoses are extremely rare among Asians in this country, the majority of those from Nigeria, Ghana, and Sudan who break down in this country do so on account of acute schizophrenia. They need prompt physical treatment, either E.C.T. or insulin coma or both. Those who are sent back to their countries without any treatment continue to suffer from psychotic symptoms. Psychiatrists in those countries have informed me that such

patients should be treated in this country before being returned to their homes, as spontaneous remissions are rare.

While each patient will need careful examination, a few hints on this may be useful. To save time three questions should be asked at the very start of the consultation, as the replies to them may give important clues as to the nature of the patient's illness. The questions are: How long have you been in this country? Have you passed any examinations? Do you get remittances from home regularly and punctually?

Lest the pendulum should swing too far it is necessary to emphasize that Asians may not suffer only from illnesses prevalent in this country but also from tropical diseases and rare conditions not often borne in mind even by experts in this country. As an example of the first type malaria complicating some other illness may be cited. A rare condition which should be borne in mind in the differential diagnosis of paraplegia among Indians and Pakistanis is lathyrism. In the very early stages it may be mistaken for hysterical paraplegia and later for a slipped disk. Cases occur in North Behar and the United Provinces of India and elsewhere. Spasm of the arteries of the spinal cord followed by thrombosis causes sclerosis of the lateral and posterior columns resulting in spastic paraplegia. The condition may last for years, but the arms are rarely involved. Those who have not seen such cases may easily recommend surgical procedures in the erroneous impression that the patient is suffering from a slipped disk.—I am, etc.,

Belmont Hospital Neurosis Centre, Sutton, Surrey. M. N. PAI.

Hysteria and the Munchausen Syndrome

SIR,—As visiting psychiatrist to a general hospital I was recently asked to see a man who had succeeded in gaining admission to one of the surgical wards. His case had earlier occasioned a circular letter being sent by the senior administrative medical officer of the regional board in which, justifiably, he warned other general hospitals in the region against admitting a man who several times, by gaining admission to hospitals, had already undergone costly and time-wasting investigations and surgical procedures to no useful purpose. Mention was made of the man's unusual ability for getting himself so readmitted—namely, by collapsing in the street, by vomiting profusely, and by presenting an extensively scarred abdomen with signs of seeming abdominal distension when examined. Mention was made also that he was even willing to undergo yet further surgical operations. When I saw him he was reported in the case notes to have "refused" to pass urine and that when catheterized 20 oz. (568 ml.) of urine had been withdrawn.

Clearly, this man, by insisting that he was ill when no signs of organic illness could be found, had acquired for himself the reputation of being a malingerer. Nevertheless, viewed psychiatrically, there could be no doubt that the patient was, in fact, ill, though in mind and not in body. Although he had himself not considered the possibility that he was ill in mind, he agreed to enter a mental hospital for appropriate treatment. There must be others like him who unjustly but understandably come to be regarded as malingerers because of failure to recognize that hysteria by disturbance of visceral functions can simulate organic disease.—I am, etc.,

Warlingham. WM. H. SHEPLEY.

Beat Knee

SIR,—As one who is concerned with the training of chiropodists, I was very interested to read in the *Journal* of July 12 (p. 100) the annotation on the miners' complaint of "beat knee." During our practice we have to deal quite frequently with acute bursitis especially in association with the first metatarso-phalangeal joint, the so-called bunion, where the irritating factors are of very much the same type as those found in beat knee. Could it not be that the principles of treatment as applied by the chiropodist with some measure of success might be equally effective when used for cases of prepatellar bursitis?

It is perhaps a little surprising that the notion that pressure only is the basic cause of bursitis still prevails and that it is necessary to restate, as you have done, that it is not pressure alone which is the cause, but constant friction. One cannot, however, eliminate entirely the pressure element, since, according to the laws of physics that friction is directly proportional to the load, the friction factor must be all the greater as the load becomes more pronounced. The load alone would not cause bursitis but it would certainly aggravate the sheering stresses which occur subcutaneously. For this reason, the failure of simple protective pads becomes inevitable. The remedy—in theory, at any rate, since we have no practical experience of beat knee—would probably lie in the designing of special types of pads which would both deflect pressure and control the sheering element. Simple elastic compression would undoubtedly help in restricting subcutaneous friction and the reabsorption of the bursal fluid, but I doubt whether such a measure would be effective as a preventive for beat knee.

In treating the inflamed bursa over the first metatarsal head the chiropodist applies elastic compression as a routine measure, but to obviate the recurrence of the condition he would apply a protective ring of felt or other fairly firm material to deflect the weight away from the area so that friction is reduced by lessening the load and in addition would cover it with a material with a "gliding" surface. It is evident that internal friction must always be present to some extent where there are surfaces which move in opposite directions, but the basic problem is how to reduce the load and at the same time to lessen the range of movement of the skin over the bone. The chiropodist would seek the reason for an excessive range of movement occurring and he would apply his pads and strapping (in addition to the deflecting ring) specifically to restrain this excessive range.

If these principles are sound the prophylactic treatment of beat knee would appear to be that any protective pad must give more than simple cushioning to the part. The pad should be applied so as to be in contact with the skin; it should be of the ring type and of not too resilient a nature. If a soft sponge pad is provided in the ring space it should have a non-gripping surface, made, for example, of a substance such as velvet. The type of surface is important, since a sponge-like pad which clings to the skin will only accentuate surface adhesion and therefore increase friction. It should preferably also be an absorbent material, since a sweaty skin is more likely to cling than a dry one. The application of a grease to the skin would also lessen surface friction and the resultant sheering in the deeper tissues, which is the physical basis of traumatic bursitis.—I am, etc.,

London, W.1. H. E. WALKER.

Buzzers for Bed-wetters

SIR,—As a quondam sufferer I must make an earnest plea for more patience and less drama in the treatment of bed-wetting. Whilst the latest methods to which you refer in your annotation (*Journal*, August 23, p. 499) lack the sadism of the earlier ones they yet involve real, if subtle, unkindness. The normal person is one who can sleep through a whole night without disturbance, and no treatment should be given which does not aim at this normal. My own childhood was one of constant "treatments" of the kindliest variety. To-day, four decades after the unhappy habit left me, I am left with two quite needless conditioned disabilities. I have an absurd fear of taking even a cup of tea at certain times. I have a foolishly facile bladder which tends to signal frantically to my brain on the smallest provocation, from time to time making miserable a social occasion or disturbing sweet sleep. A cure much worse than the (self-limiting) disease.—I am, etc.,

West Bromwich. D. SAKLATVALA.

SIR,—Dr. I. G. Wickes[1] is to be congratulated on his excellent results (see *Journal*, August 23, p. 499). No doubt others will now want to give this method a trial. According to your reviewer the main drawback would seem to be the cost of the apparatus. This is admittedly high, but with more than an even chance of complete success many parents are only too willing to pay the 6–10 guineas required to

purchase a set outright; while it is not perhaps sufficiently widely known that in necessitous cases the Chamberlain Foundation of 18, Upper Brook Street, London, W.1, is prepared to loan out a number of sets to doctors or hospitals free of charge.

However, just as we do not ask every patient requiring radiant heat to purchase a radiant-heat lamp, so it should not be necessary for every enuretic to have to purchase an electric alarm unit; and, when once the system of loaning out the apparatus from clinics is well organized, it becomes among the most economical as well as the most effective of all treatments for enuresis.—I am, etc.,

Ilkeston. T. H. GILLISON.

REFERENCE

1 Wickes, I. G., *Arch. Dis. Childh.*, 1958, 33, 160.

SIR,—In your annotation "Buzzers for Bed-wetters" (*Journal*, August 23, p. 499) you state that the method is expensive and you also suggest that proprietary brands of suitable apparatus are excessively priced. I think that from the cost of production standpoint this may very well be true, but if treatment is successful I think you will agree that most patients (and their parents) would be satisfied that their money was well spent. A greater fault, in my opinion—and I have knowledge of two brands—is that one for certain reasons is erratic in its action, to the detriment of effective training. The other works consistently. It would be instructive to know the experience of others, and I should be willing to investigate this problem more fully if doctors who had used this treatment and *found the apparatus unsatisfactory* communicated the details to me.

For patients who cannot afford to buy such apparatus, it is possible to have a number of conditioning units available at a clinic. I have had ten such units in circulation from a psychiatric clinic at Glasgow Royal Infirmary for two or three years. These were made for me at the Western Regional Physics Department, 9, West Graham Street, Glasgow, and the electrodes of bonded, double-sided aluminium foil type are also made there from a heat insulation material supplied by Rowell Ltd., 113, Douglas Street, Glasgow, C.2. The latter can be made in any occupational therapy department at little cost.

You mention "enthusiasm of the author" as being an ingredient of successful treatment. Whilst not denying the significance of such interpersonal factors, I think that in this form of treatment even "unenthusiastic authors" will get results if they apply the technique correctly and have sufficient knowledge to discern the varied technical faults that are liable to happen.—I am, etc.,

Gartcosh. WILLIAM W. GORDON.

Out-patient Anaesthesia

SIR,—I was very interested to read Professor William W. Mushin and Dr. Peter W. Thompson's report (*Journal*, June 14, p. 1376) and Dr. J. G. Bourne's letter (*Journal*, July 5, p. 47). I first saw this method used by Dr. Bourne during a postgraduate demonstration last year and was so impressed by it that I resolved to use it under pure general practice conditions and with no selection of cases. I eventually had an apparatus made by the British Oxygen Company, but as yet with only a 3-litre bag. With this I have given and carefully recorded so far 10 short anaesthetics. Three of these were dental, in the dentist's own operating room. The rest were for whitlows and the like. I intend, however slowly, to continue with these anaesthetics until I have a decent series about which to write. I may say my induction never lasted as long as either of the papers stated—at the most three-quarters of a minute, and in the case of the children about the time taken to respire eight times only.

In defence of nitrous oxide anaesthesia, it is possible to produce anaesthesia sufficient for the opening of whitlows or simple dentistry for periods up to five minutes in both adults and children without producing visible cyanosis and with fairly quick induction (but not so quick as cyclopropane), provided a careful nitrous oxide low oxygen flow is given and, when anaesthetizing with a full face-mask, the mask is never put on the patient's face until full anaesthesia is very nearly obtained.—I am, etc.,

Tonbridge, Kent. J. BARLAS.

Electrified

SIR,—The experience of your correspondents is certainly not necessarily due to improper earthing of electrical apparatus, as Dr. E. Lewis Butler suggests (*Journal*, August 30, p. 566). I also get a shock from the schoolchildren I examine several times a year. On one occasion, while examining children who were undressing in front of a large fire beside me, I got several shocks in quick succession. I was explaining to the mother the embarrassing suddenness with which I removed my hand from one child's shoulder, when she commented that she had clearly heard the spark. My impression is that the most potent producer of what I presume is static electricity is nylon underwear being pulled over the head, especially in front of a fire.—I am, etc.,

Diss, Norfolk. ROBERT MCCURDY.

Immunization Card

SIR,—I was interested in the letter written by Dr. E. C. Atkinson (*Journal*, August 23, p. 509) with regard to tetanus immunization. It is an undoubted fact that many parents do not know which immunization procedures their children have received. Every family doctor will be able to quote instances where parents have stated categorically that their children have been immunized against chickenpox or some other disease. This occurs, however careful one may have been to inform the parents at the time of immunization. The fact that a child has been immunized may appear on the N.H.S. record card, but this is not always the case. Indeed, the immunization may have been carried out without the knowledge of the family doctor; as by infant welfare clinics. In the event of accident, moreover, the card is seldom available to the doctor treating the patient.

The possibility exists that, in the future, further immunization procedures will be developed. It is therefore becoming more necessary that every person should have in his possession a record of those diseases against which he has been immunized. The time is surely ripe for the British Medical Association to approach the Ministry of Health and request that they issue a card with space for the date and type of immunization, and for the date of "booster" doses. In many cases the degree of immunity that has been conferred is allowed to drop to dangerous levels because "booster" doses have not been given. This state of affairs could be prevented by the issue of an immunization record card, and periodic scrutiny of it by the patient's family doctor.—I am, etc.,

Stoke-on-Trent. H. W. K. ACHESON.

Prevention of Lung Cancer

SIR,—Dr. A. J. Dalzell-Ward's suggestion (*Journal*, August 30, p. 563) that we should ask what are the fundamental causes of people smoking seems very reasonable, and the Central Council for Health Education might be greatly helped by a satisfactory answer to this question. Imitation of famous people is admittedly one of the motives exploited by advertisers, but surely the fact that smoking is "satisfying" is a more nearly fundamental one? Sir Walter Raleigh, for example, learnt the habit from savages and not from film stars. It would be more realistic to say that smoking is the most satisfactory of the known ways of taking tobacco (apart from its toxic effects), and that tobacco is such a satisfactory herb, fundamentally, because it yields nicotine. The questions that yet require answers are why this particularly toxic way of taking tobacco is so much preferred to others and why the effects of nicotine are so desirable.

The public do not credit smoking with any therapeutic effects except those of soothing the nerves of the addict

and curbing an excessive appetite for food. If they assume that tobacco smoke contains some stimulating principle they are well justified, and propaganda designed to obscure this fact could hardly be called education, nor is it necessary or justifiable in any way. It would seem, on the contrary, a dangerous and ultimately futile attempt on the part of the medical profession to deceive both itself and the public.—I am, etc.,

London, S.W.10. R. B. D. STOCKER.

Ergometrine with Hyaluronidase

SIR,—The studies on the puerperal uterus which Mr. W. J. Garrett and I reported (*Journal*, July 19, p. 138) were designed to measure objectively and compare the speeds of action of ergometrine when given by (i) intravenous injection, (ii) intramuscular injection, and (iii) intramuscular injection with added hyaluronidase. It was on a comparison of these speeds that we based our opinions as to the merit of routinely using intramuscular ergometrine with hyaluronidase at crowning of the head.

Mr. E. G. Jonas (*Journal*, August 16, p. 450) raises quite another issue, which I respectfully suggest is hardly relevant, when he implies that similar studies carried out in the second and third stages of labour might give very different results. In fact, there is little evidence to support this contention, and tocographic experiment shows that there is no significant difference between the speed of action of oxytocics in labour and in the early days of the puerperium. But, even allowing that the response to ergometrine is "at its zenith during labour," I would point out that it is the *comparative* speed of action of the three injections which is important. The addition of hyaluronidase to the injection undoubtedly accelerates the action of ergometrine, but the latent period is only reduced by 30%, while intravenous injection is still five times as rapid in action. It was in the light of these results that we questioned whether the adoption of the method as a routine for use by midwives was justified.—I am, etc.,

Oxford. MOSTYN P. EMBREY.

Congenital Deaf-mutism

SIR,—The article by Dr. J. McKenzie on the aetiology and treatment of congenital deaf-mutism (*Journal*, July 26, p. 201) is so full of inaccuracies and statements contrary to physiology and clinical experience that one would need twice as much space as the article itself to refute them. Five children, including four who according to responses to air conduction audiometry were almost totally deaf, were examined by an audiometrician. Because there was also a response to sensations as produced by the oscillator for bone conduction audiometry at very much smaller intensities (as compared with the air conduction responses) Dr. McKenzie concluded that he made a completely new discovery—namely, that these children suffered not from a congenital perceptive but from a conductive deafness. He had no other evidence, but it was enough for him to formulate a theory. But these theoretical considerations are based on false assumptions. It is notorious how careful one must be with bone conduction tests in children, and how even in the older ones, when very deaf, the responses can be very unreliable.

Let us now analyse these audiograms. It is interesting to see that in four of them only a residual hearing for low frequencies is registered by air conduction, and that there is quite a significant variation in these, when the four audiograms are compared. But the response to the bone conduction oscillator is almost identical in all the cases. (If you take, for example, the responses in the right ear only, registered at twelve points, only at two points is there a slight difference. Otherwise the curves are absolutely identical.) This, of course, although not *only* this, immediately casts great doubts upon the validity of these tests. I wonder how Dr. McKenzie would explain it.

I suggest that the responses to the bone conduction oscillator do not represent sensations of hearing but are responses to the vibratory elements always contained in low frequency sounds of high intensity. I would go even further and say that there is a possibility that the responses to sounds delivered via the earphones, when there is only a residual response to these low frequencies at high intensities, are only reactions to the vibratory element in the sound, and that these children often are in fact totally deaf. I am saying this from clinical observation and confirmation by histological evidence. I had the opportunity to test and observe a little girl, who was very deaf, from the age of 2½ to 3½. She responded to a very loud drum from 6 to 7 ft. (1.8 m. to 2 m.), to a loud xylophone of 500 c/s from 2 to 3 ft. (61 cm. to 0.9 m.), and to some other loud sounds of low frequency. This girl died later and the inner ear was examined histologically. There was no organ of Corti in any part of the cochlear canal; there was no vestibular membrane; also the nerve fibres entering the cochlear canal were very spare. The aetiology was a well-known type of hereditary deafness. Undoubtedly a totally deaf individual can respond to the vibratory elements of low frequency sounds even in free field, and of course even better when the sound is applied by an oscillator on the skull. When these people are tested for bone-conduction hearing it is frequently difficult (even in some adults) to explain the difference between sensations of hearing and vibration, especially when they have never experienced true sensations of hearing normally. Also frequently there is the difficulty in communication which prevents a full explanation of the differences.

Of course the crux of the matter in the case of Dr. McKenzie's article is in his statement that careful attention was given to the possibility of the child confusing hearing with vibration. Could he explain how this was done in detail? And also the method of audiometry? For some years it has been possible to carry out reliable threshold audiometry in small children, in many cases from the age of 2½, and almost as a routine from 3½. What was the type of oscillator used? What was the signal the children were given during the test which indicated a reliable response? In an article entirely based on the results of a method of examination a clear and careful description of the method employed is essential.—I am, etc.,

Harrow. L. FISCH.

Suffocation in Infancy

SIR,—I welcome Dr. J. Shackleton Bailey's letter (*Journal*, July 12, p. 104), and I agree with him that reconsideration of mechanical suffocation as the cause of many of the sudden deaths in infancy is urgently required. Unlike the pathologists mentioned in Dr. W. H. Davison's letter (*Journal*, July 26, p. 248), I have found by post-mortem, histological, and bacteriological examination an adequate natural cause of death in only about 25% of these infants. It is, I realize, a matter of opinion, but I am not persuaded that the finding of occasional mononuclear cells (some of which I think are desquamated bronchial epithelial cells) in the lung alveoli of a robust-looking infant of previous good health is adequate evidence of death from pneumonia. In the remainder of my cases, observed over the last six years, the infants were found in circumstances in which death could have been caused by suffocation. Indeed, in many cases suffocation seemed the obvious explanation of the observed circumstances. In my opinion the pathological findings were consistent with death from asphyxia.

I was therefore concerned to read that your paediatric correspondent (*Journal*, July 12, p. 111) seemed to suggest, if I understood him correctly, that asphyxia from overlying or soft pillows is an old wives' tale. I submit there is insufficient evidence to support such an opinion. I am also concerned in case such a view comes to the notice of, and is accepted by, parents; if this should happen I fear more bed and cot deaths will occur, not fewer. My experience leads me to think that the right place for a baby to sleep is in a separate cot with a firm mattress, and without a pillow until the age of 1 year, and that he should never be left unattended with a bottle in his mouth. I personally believe that if these simple conditions, observed in the children's wards of the Darlington Memorial Hospital, were put into practice in the home, many of these tragedies would be prevented.—I am, etc.,

Darlington. J. TREGILLUS.

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Nature 1958, *181*, 1397; *Nature* 1958, *181*, 1717; *Lancet* 1958, *ii*, 6.

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Perforated Ulcer in Pregnancy

SIR,—The publication of the memorandum by Mr. Martin Horwich in the *Journal* of July 19 (p. 145) prompts me to report the following case:

On December 8, 1957, a para 3, aged 28 years, who had been delivered of a live male infant on the previous day at home, was admitted as an emergency to the ward complaining of severe abdominal pain. The pregnancy was apparently quite normal until 48 hours before delivery, when she developed a mid-abdominal pain which she had never experienced before. This was accompanied by nausea, and diarrhoea on one occasion. Labour progressed normally apart from being accompanied by this pain, which was maximal in the hypogastrium, and delivery was uneventful. She vomited several times during labour, but no blood was noticed. The following day the pain became more severe and was accompanied by referred pain to the right shoulder tip.

On examination she appeared to be shocked and in severe pain. Her temperature was 98.2° F. (36.8° C.), B.P. 120/90, and pulse 98. Her abdomen was extremely tender, markedly so in the right hypochondrium, but there was no guarding or rigidity. The uterus was well contracted, being 5 in. (12.7 cm.) above the symphysis pubis. Shifting dullness was elicited and no bowel sounds were present. A provisional diagnosis of free fluid in the peritoneal cavity was made; a possible origin was thought to be a ruptured uterus. The pulse rate rose to 120 beats per minute during the following two hours, and a laparotomy was performed by Mr. C. T. F. Ealand, revealing a considerable quantity of bile-stained fluid in the peritoneal cavity and a large anterior perforation of the first part of the duodenum. Recovery was uneventful and she was discharged home a fortnight later.

As pointed out by Mr. Horwich, most cases of perforated ulcer which occur during pregnancy have a definite history, but this patient had no previous symptoms of abdominal pain or dyspepsia. Finally, I should like to draw attention to the fact that there was no guarding or rigidity of her abdomen. The absence of this classical sign of peritoneal irritation in the puerperium must be stressed, since failure to recognize this may result in serious delay in establishing a diagnosis.—I am, etc.,

Windsor. I. G. ROSS.

Posture and Blood Pressure in Pregnancy

SIR,—A patient we thought to be suffering from early toxaemia of pregnancy had had frequent blood-pressure readings taken in the lying-down position, until the occasion when for no particular reason the blood pressure was taken in her living-room while she sat at a table. This time the readings were unexpectedly low, and normal. They were repeated a few minutes later when she was lying on her bed, and again the abnormally high readings were obtained. This state of affairs continued, so that if we relied on the readings taken while she was lying down we had to regard her as a case of toxaemia, but if we heeded only the readings taken while she was in the sitting position we could say she was normal.

Since this chance observation we have taken many double readings in expectant mothers who were first sitting, then lying down (or vice versa), and have in several cases, but not all, found similar differences between the sitting and lying readings. In a few patients the two sets of readings were the same, and in one case the lying pressures were lower than the sitting. Having been unable to find any reference to this phenomenon in several important textbooks, we would be interested to know if other observers have encountered it and be grateful for views as to its significance: can the higher readings be ignored regardless of the position with which they are associated?—We are, etc.,

P. R. BOUCHER.
Winfrith, Dorset. MARGARET J. TURPIN.

Why are Medical Journals so Dull?

SIR,—Were it not for the fact that one remembers Dr. Richard Asher as the author some years ago of that stimulating article "Myxoedematous Madness,"[1] one would be inclined to take him at his word and agree with him that some, at any rate, of his present article (*Journal*, August 23, p. 502) was more than "probably irritating." One suspects Dr. Asher of writing very largely with his tongue in his cheek. To say that style is everything and all the rest—syntax, grammar, spelling, etc.—do not matter is a heresy of the worst kind.

Is style so easy to acquire? Buffon, in what is now almost a cliché, said: "Le style, c'est l'homme." Anybody, apparently, except those who write learned articles in the medical journals can write good plain English, but how many people have individuality—style in other words? Dr. Asher evidently thinks that style consists in saying what is outrageous, highly controversial, or what you will. Style is only acquired, if ever, by any given individual, through wide reading, and even that won't always do it.—I am, etc.,

Brighton, 5. G. L. DAVIES.

REFERENCE
1 Asher, R., *Brit. med. J.*, 1949, **2**, 555.

SIR,—What a fine and worthy example of the art of the editor you gave us in publishing Dr. S. Levin's enlightening article on "Stool-gazing," *following on* Dr. Richard Asher's true lament on "Why are Medical Journals so Dull?" You did make the *Journal*, August 23, a brighter one. Even Dr. Asher must admit it was a subtle appreciation of his article.

Now that you publish a list of new drugs, maybe you can help the avid reader with a list of new "words," with explanatory notes?—I am, etc.,

London, W.1. M. J. FENTON.

Coudé Catheter

SIR,—The letter from Mr. Hamilton Bailey and his colleagues (*Journal*, August 23, p. 513) has caused the research staff of *The Leech* considerable disappointment and distress, and the labelling of a "biography written in a serious and restrained vein," to use their own words, as "a hoax," "a fabrication," and "a mire" is unexpected from such distinguished men of medicine. However, the recognition given by the rest of the medical world has been most encouraging: a professor at one London medical school writes: ". . . an important contribution . . . congratulations on a fine piece of work." This will hearten us to continue to publish our researches.—I am, etc.,

D. M. J. WILLIAMS,
Cardiff. Editor, *The Leech*.

SIR,—I, too, share Dr. Peter Birkett's sorrow (*Journal*, August 30, p. 567) that great names have been dragged into the mire. However, one does not further the cause of historical accuracy by exposing one fabrication whilst condoning another. Fortunately every student knows that the real benefactor has proved to be, not Coudé, but his half-brother Bicoudé, who, as Mr. Clifford Morson (*Journal*, August 23, p. 513) well remembers, declined the presidency of the Société Internationale d'Urologie as a protest against the opening of Mercier's Bar.—I am, etc.,

London, W.1. HOWARD G. HANLEY.

SIR,—A few years before the amusing episode narrated by Mr. Stephen Power (*Journal*, September 6, p. 640) I witnessed the following incident in the surgical out-patient department of the London Hospital.

RUSSELL HOWARD: "How would you relieve this patient's retention of urine?"

STUDENT: "I would pass a catheter."

RUSSELL HOWARD: "What type of catheter?"

STUDENT: "A Coué catheter, Sir."

RUSSELL HOWARD: "Oh! And I presume as you passed this catheter you would say to the patient: 'Every day and in every way I am passing my water better and better.'"

—I am, etc.,

Sholden, nr. Deal. HAMILTON BAILEY.

*** This correspondence is now closed.—ED., *B.M.J.*

POINTS FROM LETTERS

Smallpox Vaccination

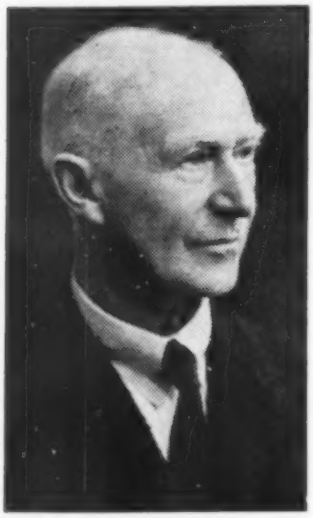
Dr. N. D. WAYNE (London, E.1) writes: In over 17 years of vaccinating people I have noticed, consistently, the appearance of a local skin reaction within ten minutes of completion of the act, when the lymph has dried. The area of scarification, or now of multiple pressure, becomes slightly raised and puckered. In all these cases the vaccination is invariably positive.

Obituary

RUPERT WATERHOUSE, M.D., F.R.C.P.

Dr. Rupert Waterhouse, who practised in Bath and was for many years a leading consultant there with a special interest in clinical pathology, died at the Royal United Hospital, Bath, on September 1 in his 86th year.

The youngest son of Dr. John Hodgson Waterhouse, Rupert Waterhouse was born at Sheffield on January 15, 1873. He was a descendant of Sir Gilbert Waterhouse, a nephew of Dr. T. Waterhouse, surgeon to Sheffield Royal Infirmary, and grandson of John Hodgson, a surgeon at Birmingham. From the Collegiate School and Wesley College, Sheffield, he went on to St. Bartholomew's Hospital, qualifying in 1897. After holding a resident appointment at the Royal Hospital, Sheffield, he graduated M.B. in 1900 and proceeded M.D. in 1903. He took the M.R.C.P. in 1908 and was elected F.R.C.P. in 1929.



Dr. Waterhouse first came to Bath in 1901, when he was appointed resident medical officer to the Royal United Hospital. Two years later he held a similar post in the Royal Mineral Water Hospital. Appointed first curator of the museum and pathologist at the Royal United Hospital, he later became an honorary physician to that hospital and to the Royal Mineral Water Hospital. He was the author of many papers, mainly on rheumatological subjects, and his description of the clinical entity of acute suprarenal insufficiency due to bilateral renal haemorrhage was published in 1911; it is now known throughout the world as the Waterhouse–Friderichsen syndrome.

A Territorial, Dr. Waterhouse served throughout the first world war in the R.A.M.C. in Gallipoli, Egypt, Palestine, and France. Serving first with the North Somerset Yeomanry, he commanded the 2nd South-West Mounted Brigade field ambulance for two years, and in 1920 was gazetted to command the 4th Southern General Hospital.

When he returned to Bath he practised mainly as a consultant in clinical pathology, and at the Annual Meeting of the B.M.A. in 1925 he was vice-president of the Section of Pathology and Bacteriology. Besides his hospital appointments in Bath he was on the staff of several hospitals in the neighbourhood, including the Victoria Hospital, Frome, the Trowbridge and District Hospital, and the cottage hospital at Chippenham. A founder member and past-president of the Bath Clinical Society, he was chairman of the Bath Division of the B.M.A. in 1923–4, and president of the Bath and Bristol Branch in 1928–9.

Dr. Waterhouse leaves a widow and a son and daughter.

G. D. K. writes: During his latter years Dr. Waterhouse was much handicapped by deafness and by lameness resulting from osteoarthritis and Paget's disease of the hip. In spite of this he was never heard to complain and retained his sense of humour and dry ready wit until the end. He will be remembered as one of the great old-time physicians of Bath, and one who was more interested in the facts of medicine and their application to human beings than to their financially gainful possibilities. He stood for all that was honourable in the medical profession and had no use for any mumbo-jumbo. He was a reliable friend, never at a loss for a humorous answer to any question, and, although for a long time he had not been able to take an active part in medical matters, he will be very greatly missed by his colleagues and many friends.

K. S. LASHLEY, M.S., Sc.D., Ph.D.

We record with regret the death of Professor K. S. Lashley, formerly research professor in neuropsychology at Harvard University. He was 68.

Karl Spencer Lashley was educated at the Universities of West Virginia and Pittsburgh, where he graduated Sc.D. in 1911. After a few years as a teaching fellow at the University of Pittsburgh, he moved to Johns Hopkins and then to the University of Minnesota, where he became professor of psychology. Appointed to the equivalent position in Chicago in 1929, he became research professor at Harvard in 1937. He also held the directorship of the Yerkes Laboratories of Primate Biology at Orange Park, Florida, where much of his most notable work was done. On giving up his post at Harvard in 1955 he was appointed emeritus professor.

Lashley made many important contributions to psychology and neurophysiology, but he was best known for his work on animal behaviour. He was an honorary member of the British Society for the Study of Animal Behaviour, and in 1951 his outstanding work was recognized by his election to foreign membership of the Royal Society.

We are indebted to Professor O. L. ZANGWILL for the following appreciation: Professor K. S. Lashley won an international reputation for his studies on brain mechanisms and intelligence. Trained in psychology, Lashley worked with Dr. J. B. Watson at Johns Hopkins University and became a leading spirit in the Behaviourist movement. But he was quick to see the limitations of doctrinaire Behaviourism and had little use for speculative theory. His ideal was a science of behaviour firmly grounded in comparative neurology. That this ideal no longer seems incredible is the true measure of his achievement. Lashley's strength derived from his masterly synthesis of physiological and psychological methods of inquiry. From the neurophysiologist he took over the method of ablation; from the animal psychologist the use of systematic training techniques such as the maze and the discrimination box. As a result of this "combined operation" it became possible for the first time to assess the effects of brain lesions on behaviour in terms of measurement. Crude though measurements of behaviour may be, they at least make possible systematic comparison of pre- and post-operative performance in animals. In this way Lashley inaugurated a new epoch in the comparative study of the brain.

As is well known, Lashley's experiments led him to the view that cortical function is considerably less specialized and less narrowly related to specific structures than had formerly been supposed. Although habits involving a single sense modality—for instance, visual discrimination—were found to be impaired or lost only after ablations limited to the corresponding cortical projection area, more complicated tasks were found to be affected by lesions anywhere in the cortex. Thus, in the case of maze performance in the rat, impairment was found to follow lesions in any cortical area and the extent of the impairment proved to be broadly proportional to the extent of the lesion. Lashley therefore postulated a very considerable degree of equipotentiality within the cortex and a principle of mass action governing its efficiency. Although later work has cast doubt on both these assumptions, Lashley's thorough experimental work will long remain as a major contribution to neurology.

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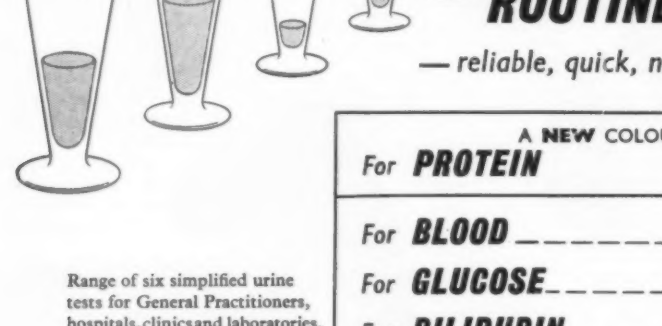

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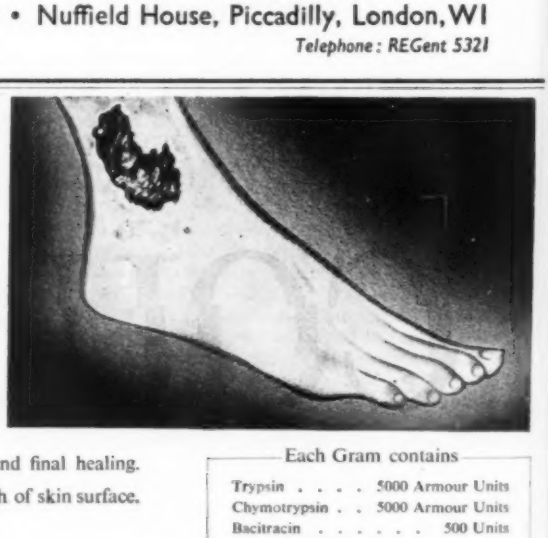

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Although Lashley made no direct contribution to clinical problems, his work has had great influence. His study of the motor cortex published in *Brain* in 1921 and his later work with Clark on cortical cytoarchitectonics have become classical. Lashley was also widely informed in the literature of aphasia, agnosia, and apraxia, and took a lively interest in the work of such men as Goldstein and Head. If in an indirect manner, his work has had great influence on our modern conceptions of cerebral function in man. Lashley visited this country on several occasions and is particularly remembered for his contribution to the Symposium on Physiological Mechanisms in Animal Behaviour held at Cambridge in 1949. Here he impressed everyone by his remarkable grasp of the subject and his extraordinary quickness of mind.

MARGARET H. R. ROBINSON, M.B., Ch.B.
D.T.M.&H.

Dr. Margaret H. R. Robinson (formerly Young), who had worked in Hornsey for nearly fifteen years as medical officer for maternity, child welfare, and school health, died at Hampstead General Hospital on July 25 after a short illness. She was 59 years of age.

Margaret Helen Rattray Young was born on August 21, 1898, and was a medical student at St. Andrews University, where she graduated M.B., Ch.B. in 1922. She took the D.T.M.&H. with the intention of going to the tropics, but instead she became bacteriologist at the Central Public Health Laboratory, Utrecht, Holland, a position which she held for two years. Much of her time there was given to the investigation of tropical diseases, but she also worked on Weil's disease and post-vaccinal encephalitis. While in Utrecht she met her future husband, Dr. Conmar Robinson, and for the next fifteen years devoted her life to her family. She then returned to work as assistant medical officer of health to the Hertfordshire Council Council and two years later to the Hornsey Borough Council. She served Hornsey well for fourteen years, bringing to the personal health services of the borough a wide knowledge of the preventive aspects of child health and a deep understanding of the psychological problems of young people.

A friend writes: Those who were privileged to know "Greta" Robinson have indeed lost an exceptional friend. "Vital" is the word that describes her best. Lively, kind, energetic yet thoughtful, she was congenial through her wide interests to many utterly different people. From her student days her beautiful soprano voice made her welcome in musical circles; she read widely, and travelled not only along well-known routes but also in by-ways, and for these journeys she and her husband would first learn the language of the country they were to visit. Besides Dutch, she spoke French and Spanish fluently, and some German and Italian. She loved to entertain, and was a charming hostess at whose happy home young and old would meet the very people they wanted most to see. Now to these memories we have to add that of the gay courage with which she faced her terminal illness. The sympathy of her many friends goes out to her husband and her son and daughter (both members of her profession) in their sorrow.

J. S. du TOIT, M.D., F.R.C.S.Ed.

Mr. J. S. du Toit, consulting ophthalmic surgeon to the Groote Schuur Hospital, Capetown, died at his home in that city on August 3. A past president of the Medical Association of South Africa, he was also for very many years its honorary treasurer. He was 72 years of age.

Jacobus Stephanus du Toit was born at Worcester, Cape Province, on March 5, 1886, and was educated at Worcester Boys' High School, at French Hoek, and at Victoria College, Stellenbosch. He studied medicine at Edinburgh University, and graduated M.B., Ch.B. in 1912, proceeding to the M.D. two years later. In 1915 he was elected F.R.C.S.Ed. After some four years of postgraduate study in ophthalmology and neurology in London, he returned to South Africa and set up in private practice as an ophthalmic surgeon in Capetown in 1916. After setting up an ophthalmic clinic at the Capetown Free Dispensary he was elected to the staff of the Somerset Hospital, which was later transferred to Groote Schuur Hospital. From 1937 to 1949 he and Dr. A. W. S. Sichel served as joint chiefs of the department of ophthalmology at the hospital and joint senior lecturers at the university. For twenty-one years he was ophthalmic surgeon to the School for the Blind at Worcester.

Dr. du Toit was for many years honorary treasurer of the Cape Western Branch of the British Medical Association, and was president of the Branch and chairman of the Capetown Division in 1929–30. Since 1929 he had been honorary treasurer of the Medical Association of South Africa, which in 1952 awarded him its gold medal for distinguished services to the medical profession and the Association. Four years later he was elected President of the Association. Dr. du Toit was a member of the council of the University of Capetown for thirty-two years and a director for twenty-five years of the Nasionale Pers Beperk. For many years he was interested in farming and owned a farm at Durbanville. In 1916 he married Miss Emmeline J. Steyn, youngest daughter of President M. T. Steyn, of the Orange Free State, and she survives him together with the three daughters of the marriage. His only son died in 1935.

G. V. T. McMICHAEL, O.B.E., M.B., Ch.B.
D.P.H.

Dr. G. V. T. McMichael, formerly medical officer of health for Paisley, died at the Western Infirmary, Glasgow, on August 22. He was 71 years of age.

George Vert Thomson McMichael was born on February 6, 1887, at Edinburgh, where his father was for many years a leading member of the city council. After receiving his schooling at George Watson's College, he studied medicine at Edinburgh University and graduated M.B., Ch.B. in 1911. In the following year he obtained the D.P.H. of the Scottish Royal Corporations. Soon after graduation he entered the public health service, and was assistant medical officer of health under the Renfrew county council until 1921. During the first world war he served for four years in the R.A.M.C., first as a regimental medical officer and then for some time in an administrative post in a general hospital in France, where his great gift for organization brought him promotion to the rank of major. In 1919 he returned to his civilian duties, and in 1921 he was appointed medical officer of health to the burgh of Paisley, a position he continued to occupy for the next 32 years. A member of the British Medical Association for 45 years, he was chairman of the Renfrewshire and Buteshire Division from 1931 to 1934. He leaves a widow, one son, and two daughters.

C. S. B. writes: During the time George McMichael was medical officer of health for Paisley he devoted all his energy and talent to improving the health services of the town, an aim in which he was brilliantly successful. An achievement that gave him great satisfaction was the establishment of the first municipally controlled maternity hospital in Scotland. He was the moving spirit also in the building of Paisley's very modern infectious diseases hospital. When first opened, almost 30 years ago, it was admitted to be—thanks to George McMichael's planning—one of the finest hospitals of its kind in Britain. Many others have been modelled on it, with its widely spaced pavilions, its well-equipped kitchens, and its admirable ancillary departments. George McMichael was a man of many activities. Among the positions he filled during his public career were those of president of the Royal Sanitary Association of Scotland, chairman of the Scottish division of the Society of Medical Officers of Health, and chairman of the Paisley and District Hospital Management Board. His good work was recognized in 1950 by his appointment as O.B.E. He suffered a long illness with the most admirable patience and cheerful courage.

HUGH MILLIGAN, M.B., B.Ch., D.P.H.

Dr. Hugh Milligan, who was in general practice at Whittle-le-Woods, near Chorley, Lancashire, died suddenly on August 23 while on holiday in the Isle of Man. He was 49 years of age.

Hugh Milligan was born at Holywood, Belfast, on January 18, 1909, and was educated at the Queen's University of Belfast, where he graduated M.B., B.Ch. in 1932. Two years later he obtained the D.P.H. He was in practice at Oldham before moving to Whittle-le-Woods in 1936. A founder-member of the Chorley and District Society for Mentally Handicapped Children, his work and interest in the society will long be remembered. In 1955 he was appointed police surgeon for the Chorley division of the Lancashire constabulary. He leaves a widow and three children.

W. McE. writes: It was as a village G.P. that Hugh Milligan earned for himself an outstanding reputation. A busy man with a large practice, he somehow managed to get to know every one of his patients, and few and far between were the ones whose background he did not remember or whose Christian name he did not use. He gave himself unsparingly to his work, and people in all walks of life valued greatly his skill, patience, advice, and friendship. Perhaps the secret of his success was his keen interest in people as individuals, and he inspired their confidence and trust because they knew he really cared. The fact that the whole village was grief-stricken at the news of his death and that something like a thousand people crowded the parish church at his funeral is an indication of the love and esteem in which he was held. This brief account would be incomplete without some mention of Hugh Milligan's personal courage. Although never very strong, he never allowed his disabilities to weigh heavily upon him, and only in extreme necessity did he allow any interference with his work. Two years ago he was forced to spend some time in hospital, yet even there he was fretting to be out and about, anxious for the welfare of his patients rather than his own. The prospect of death held little fear for him (for he had spiritual depth), but he could not bear to think of his patients looking to him in vain. His courage was impressive and his sense of humour a blessing both to himself and others. His name will long be honoured in the place where he worked: may he rest in peace.

J. C. CAMPBELL, M.B., Ch.B., F.R.C.S.Ed.

Mr. John Campbell, an ear, nose, and throat surgeon in Carlisle, who died at Cumberland Infirmary on August 26 after a short illness at the age of 36, will be greatly missed by his many friends, patients, and colleagues in Carlisle and the south-west of Scotland.

John Carr Campbell was born at Inverness on December 6, 1921, the son of a well-known doctor, and throughout his life he retained a great affection for Inverness and the Highlands. At Loretto School and Edinburgh University he was well known as a piper and for his prowess at rugby, which he played with enthusiasm and skill. After graduating M.B., Ch.B. in 1944 he held the appointment of house-surgeon at Leith Hospital, and then had a short spell in practice with his father before joining the R.A.M.C. His service in the Army was essentially spent in India during the troublesome times of 1947. He then returned to Edinburgh and pursued his main interest—ear, nose, and throat surgery—under the late Dr. G. Ewart Martin. During the tenure of his appointment at the Royal Infirmary he became a Fellow of the Royal College of Surgeons of Edinburgh in 1950. Shortly afterwards he went to Carlisle as a registrar, and after a short period in London was appointed a consultant to the East and West Cumberland groups of hospitals and to the Dumfriesshire hospitals.

A. B. MACL. writes: John Campbell's work was of the highest standard and he was a skilled operator. He had a very happy way of making friends with his patients, sparing no efforts to ensure their well-being in the widest sense, and yet he had a modest view of his own capabilities. He was perhaps at his best with children, who, shrewd judges of character as they are, loved him and would do anything for him. A speaker of considerable wit and wisdom, he was often in demand on social occasions, and played a valuable part as the secretary of the Carlisle Medical Society. His interests were sailing, in a boat which he built himself, and in the occasional week-end in his caravan, in which he took great pride and in which he was able to share his leisure with his family. We have lost a well-loved, faithful, and generous friend, and our sympathies go to his two small sons and his wife, who is also a doctor.

DANIEL P. O'BRIEN, M.D.

Dr. Daniel P. O'Brien, who had been administrator of the medical science and research division of the Rockefeller Institute for Medical Research, died at Acapulco, Mexico, on August 16.

Daniel P. O'Brien, a native of Torrington, Connecticut, was born in 1894. He graduated in medicine from Johns Hopkins University in 1920. For some years before the second world war he worked as the European representative of the Rockefeller Foundation, and for the greater part of the war he was in London, where he did much to foster Anglo-American friendship.

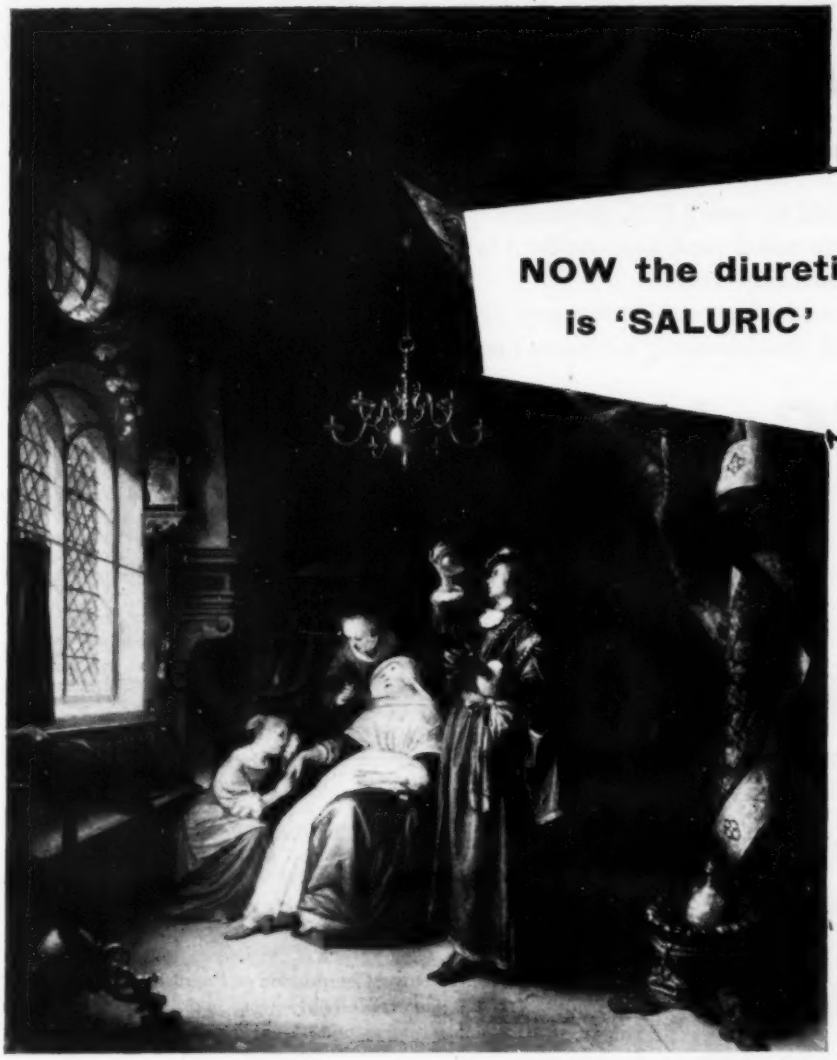
A. D. writes: News of the death of Pat O'Brien will strike a sad note in the hearts of his many British friends. After the fall of France he moved the European office of the Rockefeller Foundation from Paris to London. He took a flat in St. James's, lived among us, and shared stoically and with humour our discomforts. In 1938 he had joined the Athenaeum Club: he was often there after he came to live in London, and he retained his membership until his death. Always cheerful and optimistic, he visited incessantly the various academic institutions receiving, or desirous of receiving, grants from his Foundation. His advice was freely sought and generously given. He had the ready and genial friendliness so often found in those of Irish extraction. There was always, until his vision began to fail, a merry twinkle in his strikingly blue eyes. He was a physiologist by training, and his later interests covered every branch of medicine and science. He knew all the leading scientific workers in Europe and told fascinating anecdotes of their idiosyncrasies. He was active in bringing together American and Canadian doctors then serving in this country and their Service and civilian colleagues here. My last meeting with him was in the ophthalmic ward of the Johns Hopkins Hospital, Baltimore, where he was under treatment for detached retina. He faced resignedly the prospect of complete loss of his sight. He did, however, recover some vision, and in a letter he wrote to me some months ago he expressed the intention of revisiting London to see his "many good friends." Alas, that was not to be, and the world is poorer for his loss. He never married, and when he was "at home," which was seldom, he lived with his sister in Connecticut.

Medico-Legal

MUNCHAUSEN SYNDROME

[FROM OUR LEGAL CORRESPONDENT]

On July 1 John Sherratt, aged 32, pleaded guilty at Melton Mowbray to obtaining food and drugs valued at £2 from Melton Mowbray War Memorial Hospital, and asked for no fewer than nine similar offences in hospitals in the preceding six months to be taken into consideration. He had been admitted complaining of abdominal pains, and the hospital food and drugs he had had over all 10 efforts amounted to £57 11s. 10d. He was sentenced to six months' imprisonment (*Manchester Guardian*, July 2). Another example of the Munchausen syndrome is reported in our correspondence columns this week (p. 690), but in that case the patient agreed to enter a mental hospital for treatment.



"La Femme Hydropique" (The Dropsical Woman) by Gerard Dou, painted in 1665. The original hangs in The Louvre.
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Vital Statistics

Venereal Diseases

In England and Wales during the quarter ending March 31, 1958, 1,088 new cases of syphilis were reported as attending the clinics as compared with 1,292 the previous year. Of these, 171 were classified as primary, secondary, or latent in the first year of infection. 8 cases of congenital syphilis in children aged under 1 year were reported, and 107 cases in persons over that age. New cases of gonorrhoea (with corresponding 1957 figures in parentheses) numbered 6,056 (5,073), of chancroid 76 (77), and of non-gonococcal urethritis (males only) 3,642 (3,662).—*Monthly Bulletin of the Ministry of Health*, August, 1958.

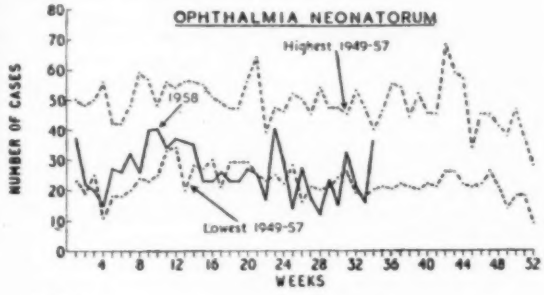
Industrial Accidents and Diseases

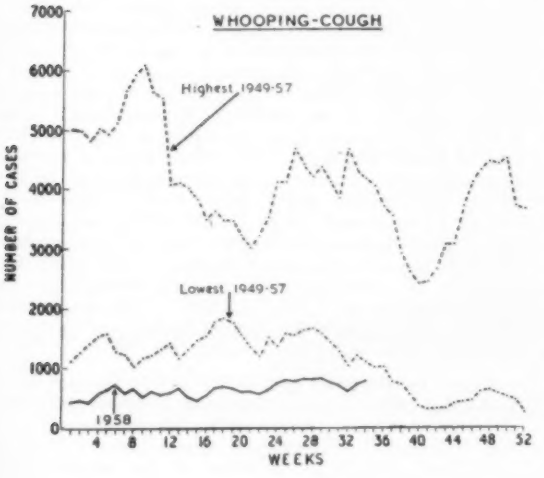
The number of workpeople (other than seamen) in the United Kingdom whose deaths from accidents in the course of their employment were reported in July was 105, compared with 116 in the previous month and 114 in July, 1957.

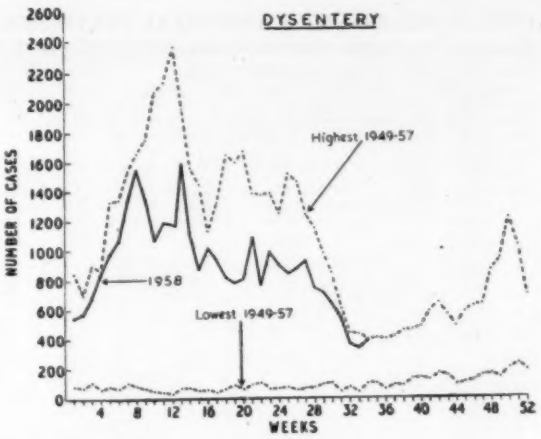
The numbers of cases of industrial diseases in the United Kingdom reported during July, 1958, were as follows: lead poisoning 2, aniline poisoning 1, compressed-air illness 1, epitheliomatous ulceration 10, chrome ulceration 17; total 31. There were no deaths.—*Ministry of Labour Gazette*, August, 1958.

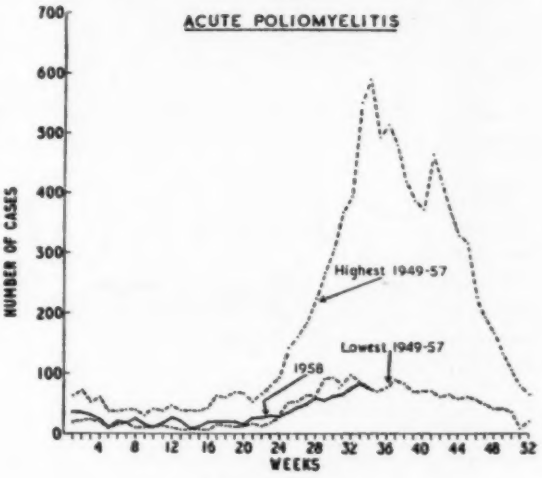
Graphs of Infectious Diseases

The graphs below show the uncorrected numbers of cases of certain diseases notified weekly in England and Wales. Highest and lowest figures reported in each week during the years 1949–57 are shown thus ------, the figures for 1958 thus ————. Except for the curves showing notifications in 1958, the graphs were prepared at the Department of Medical Statistics and Epidemiology, London School of Hygiene and Tropical Medicine.









Week Ending August 30

The largest increases in the numbers of notifications of infectious diseases in England and Wales during the week ending August 30 were 171 for food-poisoning, from 226 to 397, and 40 for whooping-cough, from 770 to 810; the largest decreases were 986 for measles, from 3,796 to 2,810, and 40 for scarlet fever, from 326 to 286.

The largest decreases in the incidence of measles were 146 in Kent, from 270 to 124, 67 in Gloucestershire, from 147 to 80, 56 in Wiltshire, from 85 to 29, 54 in Essex, from 194 to 140, 54 in Lancashire, from 465 to 411, and 53 in Surrey, from 103 to 50. Only small variations were reported in the local returns of scarlet fever. The largest fluctuations in the trends of whooping-cough were a rise of 35 in Warwickshire, from 35 to 70, and a fall of 39 in Sussex, from 70 to 31. No case of diphtheria was notified; in the preceding week there were 2 notifications.

The notifications of acute poliomyelitis numbered 78, and these were 4 more for paralytic and 3 fewer for non-paralytic cases than in the preceding week. The largest returns were Lancashire 15 (Manchester C.B. 6, Burnley C.B. 2, Preston C.B. 2, Nelson M.B. 2), Yorkshire West Riding 9 (Leeds C.B. 3, Sheffield C.B. 2), Devonshire 5 (Plymouth C.B. 3), Staffordshire 5 (Stoke-on-Trent C.B. 2).

The notifications of dysentery numbered 376 and were 8 fewer than in the preceding week. The chief centres were Yorkshire West Riding 69 (Leeds C.B. 28, Thorne R.D. 15), Lancashire 67 (Liverpool C.B. 15), London 41 (Islington 11), and Warwickshire 31 (Birmingham C.B. 19).

One-half of the notifications of food-poisoning were from Hampshire (Basingstoke R.D. 153, Winchester M.B. 37).

INFECTIOUS DISEASES AND VITAL STATISTICS

Summary for British Isles for week ending **August 23** (No. 34) and corresponding week 1957.

Figures of *cases* are for the countries shown and London administrative county. Figures of *deaths* and *births* are for the whole of England and Wales (London included), London administrative county, the 17 principal towns in Scotland, the 10 principal towns in Northern Ireland, and the 14 principal towns in Eire.

A blank space denotes disease not notifiable or no return available.

The table is based on information supplied by the Registrars-General of England and Wales, Scotland, N. Ireland, and Eire, the Ministry of Health and Local Government of N. Ireland, and the Department of Health of Eire.

CASES	1958					1957				
	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire
Diphtheria ..	2	1	1	0		6	0	1	0	1
Dysentery	384	55	150	21	4	287	26	164	9	7
Encephalitis, acute	5	0		1		3	0		1	
Enteric fever:										
Typhoid ..	4	0	0	0	1	4	1	1	0	
Paratyphoid ..	4	1	1(B)	0	2(B)	12	2	0	0	
Food-poisoning ..	226	27	21	3		336	26	15	54	
Infective enteritis or diarrhoea under 2 years				17	32				10	30
Measles*	3,796	221	11	24	19	4,267	90	32	25	23
Meningococcal infection	14	1	5	0	3	25	2	15	0	
Ophthalmia neonatorum	36	1	5	0		29	5	5	0	
Pneumonia† ..	151	15	110	6	0	176	5	103	0	
Poliomyelitis, acute:										
Paralytic ..	42	1	16	2	5	188	14	3	24	3
Non-paralytic ..	35	2				175	15			
Puerperal fever§ ..	198	30	16	1		229	45	19	4	
Scarlet fever ..	326	31	47	10	16	255	18	40	17	16
Tuberculosis:										
Respiratory ..	452	63	74	9		577	70	74	14	
Non-respiratory	81	13	15	1		73	4	10	7	
Whooping-cough ..	770	36	95	72	24	1,107	46	60	4	28

DEATHS	1958					1957				
	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire	Eng. & Wales	Lond.	Scot.	N. Ire.	Eire
Diphtheria ..	0	0	0	0	0	No comparable figures available.	0	0	0	1
Dysentery ..	0	0		0			0		0	
Encephalitis, acute		0			0		0			0
Enteric fever ..	0	0	0	0			0	0	0	
Infective enteritis or diarrhoea under 2 years	8	0	0	0	2		0	0	0	1
Influenza	1	0	0	0	0			0		0
Measles		0	0	0	0		0	0	0	0
Meningococcal infection		0	1				0	1		
Pneumonia ..	288	20	16	8	1		11	12	8	4
Poliomyelitis, acute	3	0		0	0		1		2	0
Scarlet fever ..		0	0	0	0		0	0	0	0
Tuberculosis:	54									
Respiratory ..		1	9	0	0		4	4	0	1
Non-respiratory		0	0	0	0		1	0	2	0
Whooping-cough ..	1	0	0	0	0		0	0	0	2
Deaths 0–1 year ..	248	25	32	8	12		24	19	5	11
Deaths (excluding stillbirths) ..	7,867	632	485	86	143		617	480	100	143
LIVE BIRTHS ..	13,602	1081	920	203	355		1088	909	212	414
STILLBIRTHS ..	300	19	22				25	18		

* Measles not notifiable in Scotland, whence returns are approximate.
† Includes primary and influenzal pneumonia.
§ Includes puerperal pyrexia.

Medical News

Medical Research Council.—The Committee of Privy Council for Medical Research, after consultation with the Medical Research Council and with the president of the Royal Society, have appointed as members of the M.R.C. Professor R. H. S. THOMPSON, professor of chemical pathology at Guy's Hospital Medical School; Professor E. J. WAYNE, regius professor of practice of medicine at Glasgow; and Professor B. W. WINDEYER, professor of radiology at the Middlesex Hospital.

Imperial Cancer Research Fund.—Dr. J. CRAIGIE, F.R.S., has resigned his post as director of the Fund's Mill Hill laboratories, so that he can devote himself entirely to research. Dr. R. J. C. HARRIS is joining the Fund's scientific staff on October 1 to take up a new appointment as head of the division of experimental biology and virology. He will also be responsible, under the director, Professor G. F. MARRIAN, F.R.S., for the general administration of the Mill Hill laboratories. Dr. A. R. CURRIE, at present assistant pathologist at the Royal Infirmary, Glasgow, has been appointed head of the division of pathology, and will take up his duties on October 1, 1959.

Polio Vaccination.—On July 21 Mr. DEREK WALKER-SMITH announced the Government's intention of extending their poliomyelitis vaccination programme by raising the upper age limit from 15 to 25, including a wider range of hospital staff, and making a start on third injections (*Journal*, July 26, pp. 218 and 254). Administrative details of these extensions have now been sent to local health authorities, hospital authorities, and executive councils. The Ministry recommends first, however, a drive to complete the vaccination of existing priority groups—children between the ages of 6 months and 15 years, expectant mothers, general practitioners, and certain hospital staff and their families. Raising the age limit to 25 is estimated to make a further 6,250,000 persons in Britain eligible for vaccination; the extension to further hospital staff (including medical students) and families will account for another 500,000 persons; and those due for third injections will comprise about 200,000 vaccinated in 1956 and 3,500,000 vaccinated in 1957. These extensions are based on advice given by the joint committee on poliomyelitis vaccine under Lord COHEN OF BIRKENHEAD'S chairmanship, set up by the Central and Scottish Health Services Councils. By the end of last month a total of 16,164,995 doses of vaccine had been distributed in Britain, of which 5,680,871 were British and 10,484,117 Salk vaccine.

Committee on Artificial Insemination.—The membership of the Home Secretary's committee of inquiry into the practice and legal consequences of human artificial insemination (*Journal*, August 9, p. 397) has now been announced. There are three members of the medical profession, Dr. PRISCILLA FITZGIBBON, an anaesthetist and also magistrate to a juvenile court; Dr. D. T. MCDONALD, a general practitioner and former president of the North of England Branch of the B.M.A.; and Professor R. E. TUNBRIDGE, professor of medicine at Leeds University. The other members are Mrs. PEGGY JAY, Mr. R. RISK, a former president of the Law Society of Scotland, Mr. J. ROSS, formerly head of the children's department at the Home Office, Mr. JUSTICE STEVENSON, a judge of the Probate, Divorce, and Admiralty Division, and Mrs. ELIZABETH WHITLEY. The committee's chairman, as announced earlier, is Lord FEVERSHAM. The secretary is Mr. R. F. D. SHUFFREY, of the Home Office (Whitehall, London, S.W.1), to whom any correspondence should be addressed.

Society for the Study of Fertility.—The officers and committee for 1958–9 are as follows: chairman, Dr. T. MANN, F.R.S.; secretary, Dr. A. S. PARKES, F.R.S.; editorial secretary, Professor R. S. HARRISON; treasurer, Mr. H. H. FOURACRE BARNES; ordinary members of the committee, Dr.

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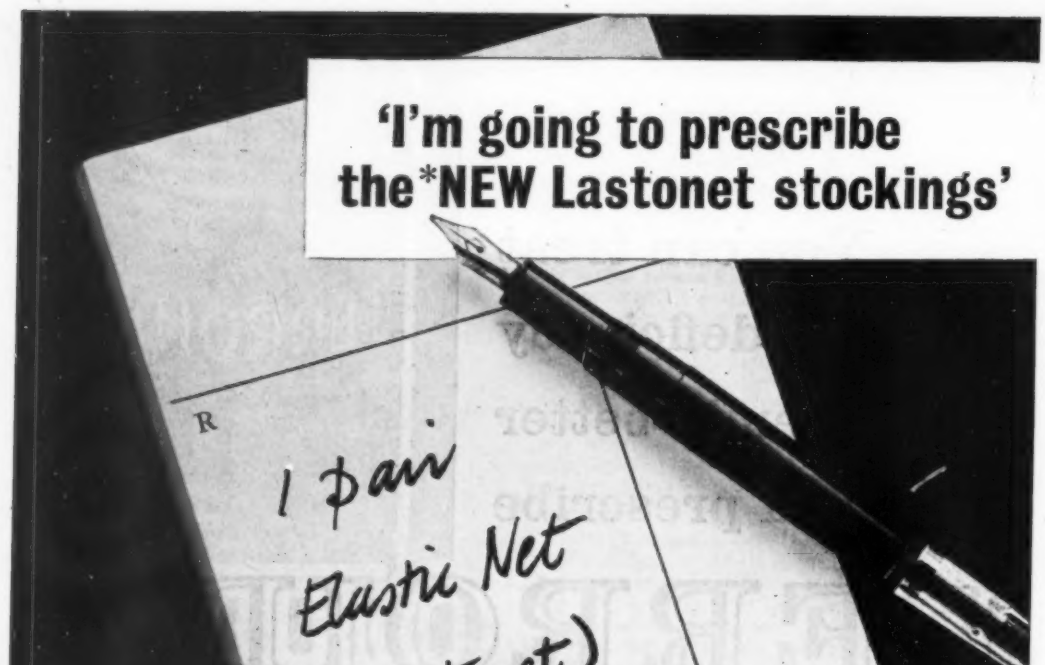

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G. I. M. SWYER, Dr. P. M. F. BISHOP, Dr. E. J. C. POLGE, Miss P. SCOTT, and Mr. H. G. HANLEY. The Society's annual conference will be held next year in Dublin from May 28 to 30.

Hon. Fellows of Royal Faculty.—At a ceremony at the Royal Faculty of Physicians and Surgeons of Glasgow on August 29 the president, Professor STANLEY ALSTEAD, conferred honorary fellowships on Sir ALEXANDER FLECK, F.R.S., president of the British Association and chairman of Imperial Chemical Industries; Sir MAURICE BLOCH, founder of the Maurice Bloch Trust and donor of the Maurice Bloch lecture theatre; Professor CARL H. BROWNING, F.R.S., emeritus professor of bacteriology at Glasgow University; and the Hon. Mrs. STIRLING OF KEIR for her lifetime's work on behalf of the medical and medical auxiliary services. In the 359 years of its existence the Royal Faculty has conferred its honorary fellowship on only 56 previous occasions, and only once before on a lady.

F.R.F.P.S.—The following were admitted fellows of the Royal Faculty of Physicians and Surgeons of Glasgow on September 1: *Qua* physicians, Dr. S. MUKHERJEE, Professor T. FERGUSON RODGER, Dr. G. RUTLEDGE, and Professor T. SYMINGTON; *qua* surgeon, Mr. R. RANCHODBHAI PATEL.

Medical Chairs in Nigeria.—Mr. W. W. DAVEY, consultant surgeon to the Whittington Hospital, London, has been appointed to the chair of surgery at University College, Ibadan, in succession to Miss BEATRICE JOLY. Mr. Davey is a graduate of Queen's University, Belfast. Dr. G. M. EDINGTON, consultant pathologist to Whiston and Rainhill Hospitals, Liverpool Region, and formerly specialist pathologist in charge of the Medical Research Institute and Laboratory Services, Gold Coast, has been appointed to the chair of pathology at Ibadan in succession to Dr. B. G. T. ELMES. Dr. Edington graduated from Glasgow University.

Nigerian Minister in London.—The Nigerian Federal Minister of Health, Mr. AYO ROSIJI, arrived in London last week for discussions here and on the Continent with mental health experts.

Health of Directors.—The Institute of Directors has set up a medical research unit to inquire into the health problems of directors. Mr. H. B. WRIGHT, F.R.C.S., formerly surgical officer to the Shell Petroleum Company, is in charge of the unit. The institute defines the unit's purpose as follows: (1) To demonstrate statistically the facts about the special occupational health hazards to which executives are liable; (2) to define and isolate the causes and effects of such hazards; and (3) to find ways of overcoming them.

Fellowship for Cancer Research.—Applications are invited for a fellowship tenable at the Memorial Center, New York, a training centre specializing in cancer and allied diseases and affiliated to Cornell University Medical College. The fellowship (salary $6,000) is for one year, normally beginning July 1, and is renewable for one or two years. Candidates must be graduates of medical schools approved by the American Medical Association and have completed at least two years' postgraduate training in internal medicine in addition to a year's internship. The fellowship provides opportunity for study and clinical investigation at the Memorial Center. Further information is obtainable from Dr. LLOYD F. CRAVER, Memorial Center for Cancer and Allied Diseases, 444, East 68th Street, New York, 21.

Medical Section of S.F.A.—The Scientific Film Association has established a medical section. Further information about the new section may be obtained from the secretary, S.F.A., 3, Belgrave Square, London, S.W.1.

"Family Doctor."—The theme of the September issue of *Family Doctor* is "back to school." Subjects such as growing boys and girls, immunization, and intelligence are reviewed.

COMING EVENTS

Royal College of Surgeons.—The College's second provincial meeting of fellows and members is being held at Cardiff on September 26 and 27. The programme includes a dinner, a scientific session at the Cardiff Royal Infirmary, the annual meeting of the College, and a lecture by Sir RUSSELL BRAIN on "The Cervical Spine." Further information may be obtained from the secretary, Royal College of Surgeons, Lincoln's Inn Fields, London, W.C.2.

Green-Armytage Anglo-American Sterility Lecture.—Mr. V. B. GREEN-ARMYTAGE will lecture on September 26 at 5 p.m. at the Royal Society of Medicine. His subject will be "Recent Advances in the Surgery of Infertility."

National Society for Clean Air.—Annual conference and exhibition, October 1–3 in Llandudno. Details from the society, Palace Chambers, Bridge Street, London, S.W.1.

Sheffield Medical School.—Old Students' Association dinner, October 11, 6.30 p.m. for 7 p.m. at Firth Hall. Details from the secretary of the association, c/o Department of Pathology, University of Sheffield, Sheffield, 10.

NEW ISSUES

SPECIALIST JOURNALS AND ABSTRACTS

The journals listed below are obtainable from the Publishing Manager, B.M.A. House, Tavistock Square, London, W.C.1.

Journal of Neurology, Neurosurgery and Psychiatry.—Issued quarterly (£3 annually). The new issue (Vol. 21, No. 3), includes:

CEREBELLAR HYPOPLASIA ASSOCIATED WITH SYSTEMIC DEGENERATION IN EARLY LIFE. R. M. Norman and H. Urich.
CLINICAL AND ELECTROENCEPHALOGRAPHIC OBSERVATIONS IN ALZHEIMER'S DISEASE. F. Letemendia and G. Pampiglione.
INVESTIGATIONS OF E.E.G. FINDINGS IN PRESENILE DEMENTIA. D. W. Liddell.
THE CENTRIFUGAL PATHWAY FOR MICTURITION WITHIN THE SPINAL CORD. P. W. Nathan and Marion C. Smith.
LANGUAGE DISORDER IN A CASE OF KORSAKOFF'S SYNDROME. P. R. F. Clarke, Maria Wyke, and O. L. Zangwill.
THE SURGICAL SEPARATION OF SIAMESE TWINS CONJOINED BY THE HEADS (CEPHALOPAGUS FRONTALIS) FOLLOWED BY NORMAL DEVELOPMENT. Maitland Baldwin and Anatole Dekaban.
YAWNING. Jacques Barbizet.
OPHTHALMIC HERPES ZOSTER WITH CONTRALATERAL HEMIPLEGIA. C. Anastasopoulos, K. Routsonis, and C. S. Ierodiakonou.
A PRELIMINARY REPORT ON THE LACK OF TOXICITY OF A PREPARATION OF TOTAL RAUWOLFIA ALKALOIDS. Homai M. Colabawalla.
THE SYNDROME OF ACUTE CENTRAL CERVICAL SPINAL CORD INJURY. Richard C. Schneider, John M. Thompson, and Jose Bebin.

Abstracts of World Medicine.—Issued in the first week of each month, this journal contains abstracts of important papers selected from the current medical literature of the world. Annual subscription £4 4s.

SOCIETIES AND LECTURES

A fee is charged or a ticket is required for attending lectures marked ● Application should be made first to the institution concerned.

Friday, September 19

BRITISH TUBERCULOSIS ASSOCIATION.—At 26, Portland Place, W., 5 p.m., Dr. D. A. Mitchison: Methods of Assessment and the Significance of Drug Resistant Mycobacterium Tuberculosis; Dr. D. B. Llewellyn-Morgan: Some Factors in the Production of Drug Resistant Mycobacterium Tuberculosis; Dr. H. E. Thomas: Clinical Findings in Birmingham Patients with Drug Resistant Organisms; Dr. Sheila M. Stewart: Correlation Between the Clinical Outcome of Treatment and the Results of Bacteriological Resistance Tests. Discussion to be opened by Dr. J. G. Scadding.
INSTITUTE OF DISEASES OF THE CHEST.—5 p.m., Dr. J. L. Livingstone: clinical demonstration.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

Davidson.—On July 2, 1958, at 18, Frank Dixon Way, Dulwich, London, S.E., to Veronica (formerly Fortune) and John H. Davidson, M.B., B.S., a brother for Diana and Penelope—Michael Peter John.
Hughes.—On August 31, 1958, at Aberystwyth, to Dr. Elinor (formerly Cleland) and Dr. John H. Hughes, a daughter—Kathryn Anne.

DEATHS

Frazer.—On September 8, 1958, at the Royal Southern Hospital, Liverpool, William Mowll Frazer, O.B.E., M.D., M.Sc., D.P.H., aged 70.
Hance.—On September 5, 1958, at Machynlleth, Montgomerysbire, Sir James Bennett Hance, K.C.M.G., K.C.I.E., O.B.E., M.D., F.R.C.S.Ed., Lieutenant-General, I.M.S., retired, aged 71.
Oakley.—On August 16, 1958, Philip Douglas Oakley, C.B.E., M.R.C.S., L.R.C.P., D.T.M., late D.M.S., Sierra Leone, of Coasters Cottage, Roundabout, Pulborough, Sussex.
Wells.—On August 13, 1958, at 10, Lambridge, Bath, Somerset, Lionel Thomas Wells, M.R.C.S., L.R.C.P., aged 88.

Any Questions?

We publish below a selection of those questions and answers which seem of general interest. It is regretted that it is not possible to supply answers to all questions submitted.

Immediate Treatment of Cardiac Infarction

Q.—*What immediate emergency treatment should be given at the onset of a case of cardiac infarction with syncope?*

A.—Syncope at the onset of cardiac infarction is relatively uncommon. It is usually of the vaso-vagal type and hence short-lived and self-limiting. The patient should be laid flat and morphine given to relieve pain. Rarely it may be due to heart block (Stokes–Adams attack), when one would be forced to use isoprenaline, 5 mg. rectally, in spite of its stimulant action on the myocardium with consequent tendency to cause ventricular fibrillation. If *shock*, as distinct from syncope, is present, with a systolic blood pressure of 80 mm. Hg or below, then an attempt should be made to elevate the pressure with mephentermine sulphate, 15 mg. intramuscularly, repeated as necessary, in addition to complete rest, oxygen, and pain relief. Recently digoxin has been suggested as a vasopressor, and, while undoubtedly useful, it may cause sudden death from ventricular fibrillation and hence cannot be unreservedly recommended.

Pregnancy after Nephrectomy

Q.—*Does the risk of renal damage justify advising against pregnancy in a woman of 25 who has recently had a nephrectomy for complete fibrosis of the left kidney?*

A.—Before advising this patient about future pregnancy the function of the remaining kidney must be fully assessed. There have been many cases recorded of successful pregnancy following nephrectomy when the remaining kidney was healthy. This undergoes compensatory hypertrophy, and two years should be allowed to elapse between the operation and the beginning of a pregnancy. If the nephrectomy was for renal tuberculosis the prognosis is not so good. The management of pregnancy after nephrectomy does not differ from normal except there must be extra vigilance in the early detection and prevention of pre-eclamptic toxaemia. Pyelonephritis must be treated promptly, and, if this is resistant to treatment, the pregnancy should be terminated.

Midwifery Bag

Q.—*What should the midwifery bag of a general practitioner contain?*

A.—*Instruments.*—Most general practitioners try to equip their bags with all the instruments they will need in midwifery: sterilizer; scissors; needles; obstetric forceps; artery forceps; needle holder; vaginal speculum; dressing forceps; sterile catgut and silkworm or nylon; syringes—1 ml. and 10 ml. with suitable needles; rubber catheter—fine; packet of cord thread—sterilized. I also carry long artery forceps, ovum and volsellum forceps, and a Drew Smythe catheter. I include in a small canvas instrument-bag two intravenous cannulas and a scalpel. *Apparel.*—Rubber gloves—two pairs or more—and a tin of glove powder; face masks; one apron. *Drugs.*—Morphine, pethidine, "omnopon," and scopolamine in ampoules; oxytocin and ergometrine in ampoules; hyaluronidase ampoules; sedative tablets—e.g., tab. butobarbiton., gr. 1½ (0.1 g.); tab. codein. co. *Anaesthetics.*—Some doctors carry both local and general anaesthetics (if they use chloroform) in the midwifery bag. Others, who use more complicated forms of anaesthesia, require more bags. I suggest one bottle of chloroform and drop bottle; procaine 2% in a 10-ml. rubber-capped bottle (for use in suturing perineums); sodium thiopentone and sterile water in ampoules (which I would use only for control of eclamptic fits); Schimmelbusch mask; lint; gag and tongue forceps; strap or harness for lithotomy position. Gas (N_2O) and air or trichlorethylene have to be carried separately. If a Minnitt machine is used it is possible to replace one N_2O cylinder with an oxygen cylinder for giving oxygen to mother or child. *Antiseptics.*—Scrubbing brush; cake of soap; "dettol," small bottle or equivalent; small kidney bowl.

A douche can is hardly ever used now, but the rubber tubing may be useful for making veins stand out. It is essential to have another bag containing transfusion-giving sets, bottles of serum or dextran, and sterile water. This bag may also hold 1 lb. (0.45 kg.) of cotton-wool. Finally, a word of warning—never carry a narcotic drug like morphine in a bottle which looks or feels like a bottle of local anaesthetic. No doubt general practitioners always read the label, but too often the eye sees what it expects to see rather than what is on the label.

Seaweed Preparations

Q.—*Is there any poisonous principle in Fucus or other seaweed? Were the slimming properties attributed to these plants real or imaginary?*

A.—There are no poisonous principles in medical preparations made from seaweed. They have no positive slimming properties, but they have practically no calorie value and act to some extent as bulk purgatives in the same way as methyl cellulose or agar-agar. Foods made with methyl cellulose, such as biscuits, have a certain satiety value, while agar-agar, which is actually made from seaweed, when sprinkled on food has hydroscopic qualities and consequently has a laxative effect owing to the bulk which it induces in the diet. In consequence, they may be said to exercise a secondary effect in causing slimming.

Correction.—Dr. A. J. Dalzell-Ward informs us that he made an inadvertent omission from his letter on prevention of lung cancer (*Journal*, August 30, p. 563). The first sentence of the last paragraph should have read "... the mortality from lung cancer amongst smokers was three times that amongst men who had given up the habit more than 10 years previously, and 76% greater than that amongst men who had given up the habit less than 10 years previously."

Collected Articles from the "British Medical Journal"

The following books are available through booksellers or from the Publishing Manager, B.M.A. House. Prices, which include postage, are now the same for both inland and overseas.

Emergencies in General Practice (26s. 9d.).

Refresher Course for General Practitioners, Volumes 2 and 3 (26s. 9d.).

Clinical Pathology in General Practice (22s. 3d.)

Any Questions?, Volumes 2 and 3 (8s. 3d. each).

All communications with regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1. TELEPHONE: EUSTON 4499. TELEGRAMS: *Aitiology, Westcent, London.* ORIGINAL ARTICLES AND LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

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